United States Department of Agriculture

Plaskett-Keller August Complex Phase 1

Environmental Assessment

View of Plaskett Meadows recreation area from Black Butte Summit (photo by Ryan Mikulovsky)

Forest Service

Mendocino National Forest

December 2021

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1. Introduction

The Mendocino National Forest is proposing to remove fire-killed and fire-injured trees from approximately 2,164 acres within the August Complex. Of this, 1,173 acres would be made available for salvage while remaining fuels would be disposed of on site (e.g., pile burning) or through biomass removal. These actions are proposed to be implemented on the Covelo and Grindstone Ranger Districts of the Mendocino National Forest.

We prepared this environmental assessment (EA) to determine whether there will be a finding of no significant impact and whether to prepare an environmental impact statement.

The August Complex started on August 17, 2020 from a series of lightning strikes. The complex originated from 38 separate fires. While most of the initial fires were extinguished with available resources, four of the largest fires (Doe, Tatham, Glade, and Hull fires), merged by August 30. On September 9, the Doe Fire, the largest of the August Complex, surpassed the 2018 Mendocino Complex to become both the single-largest wildfire and the largest fire complex recorded in California history. By the time the fire was contained on November 12, the August Complex Fire had burned a total of 1,031,886 acres, including 612,217 acres within the Mendocino National Forest administrative boundary.

Figure 1. Photo of August Complex fire-burned trees. On the western flank of Black Butte Mountain, looking toward Anthony Peak. The Plaskett-Keller Phase 1 Project is designed using findings of a Rapid Assessment that was conducted for the August Complex fire area. The Rapid Assessment (USDA, 2020b) evaluated short-term post-fire restoration opportunities, public safety, cultural, natural resource concerns, and integrated short-term strategy with medium- to long-term strategic management of the post fire landscape. This project is the first step for the Forest to begin its recovery from the fire.

This project was scoped in February of 2021 with a larger treatment area and with the intent of requesting an Emergency Situation Determination (ESD). After reviewing scoping comments from the

public and detailed internal review, the Forest reduced the treatment area to less than 2,200 acres and decided not to pursue an ESD.

1.1. Proposed Project Location

The project is located about 15 miles east-southeast of Covelo and 36 miles west-northwest of Willows. The project area is 15,061 acres although treatments would only occur on less than 2,200 acres. The project includes Plaskett Meadows and Keller Lake to the south and extends north to Mendocino Pass. The Black Butte Wild and Scenic River (WSR) corridor is excluded from the project boundary and activities. The closest activity units are at least 0.4 miles from the WSR the corridor.

The project is located within the Black Butte River watershed, which is identified as a key watershed under the Mendocino National Forest Land and Resource Management Plan (LRMP). In general, the Black Butte watershed has a Mediterranean climate that is mild, with cool, occasionally cold, wet winters and hot, dry summers. There is some coastal influence but little to no summer fog. Winter low temperatures near the mouth of the Black Butte River are generally above 20 degrees Fahrenheit, while summer high temperatures are usually just above 100 degrees Fahrenheit, with occasional extremes outside this range.

Average annual precipitation is about 60 inches a year, ranging from 38 inches at the mouth of the Black Butte River to over 70 inches near Bald Mountain. Over 80 percent of the seasonal rainfall occurs between November 1 and April 1. Snow occasionally falls below 2,500 feet, but it seldom builds up any significant snowpack below 5,000 feet. Most of the major valleys are free of snow year-round. June, July, and August are typically very hot and dry.

The Black Butte River is often turbid, particularly during seasonally high runoff. Late-season runoff can extend into April, May, and June. The stream flow is unregulated by any dams or diversions, and the river responds quickly to snowmelt and rainstorms.

The topography within, and adjacent to, the Black Butte River consists of a series of ridges running southwest to northeast, with slopes varying from nearly level to greater than 30 percent. The Black Butte River's inner gorge is challenging to explore. The general trend of the gorge is roughly parallel to the San Andreas Fault, which helps to shape much of California's topography. The major fault zone is about forty miles to the west of the Black Butte River. The related lesser-known Bartlett Springs Fault Zone is 4-7 miles away to the west and is a subject of research by the United States Geological Survey and the California Geological Survey. Both fault systems can produce earthquakes that can trigger landslides and rockfall. The watershed's inner gorges are narrow, with steep sides that are dominated by debris slides. The river's erosive waters carry higher rates of suspended sediments than most rivers of the world. This is characteristic of the entire Eel River system. These high sediment rates are due to a combination of factors, including very high annual rainfall, easily eroded sedimentary rocks in the basin, and its many streambank landslides.

Two lakes are located within project boundaries (but not within project units); Keller and Plaskett Lakes. Keller Lake is a small wetland habitat on the southwestern flank of Black Butte peak and contains sphagnum peatland as well as an area of open water. Plaskett Lakes are naturally occurring, but the outflows have been artificially raised to retain water longer in the season. Plaskett Meadows are a botanically rich area with many uncommon native plant species. Additional details on these areas can be found in the Botany section.

The predominant vegetation cover of the project area is mixed conifer and hardwood forest (see Silviculture section). Records dating back to 1960 show the project area had limited management, with approximately 2,000 acres total of silviculture or fuels-related work. Only seven wildland fires burned between 1980 and 2020. Prior to the 2020 August Complex, recorded fires were all under 250 acres in size. The 215-acre Baseball fire in February 2020, was the last notable fire in the project area prior to the August Complex.

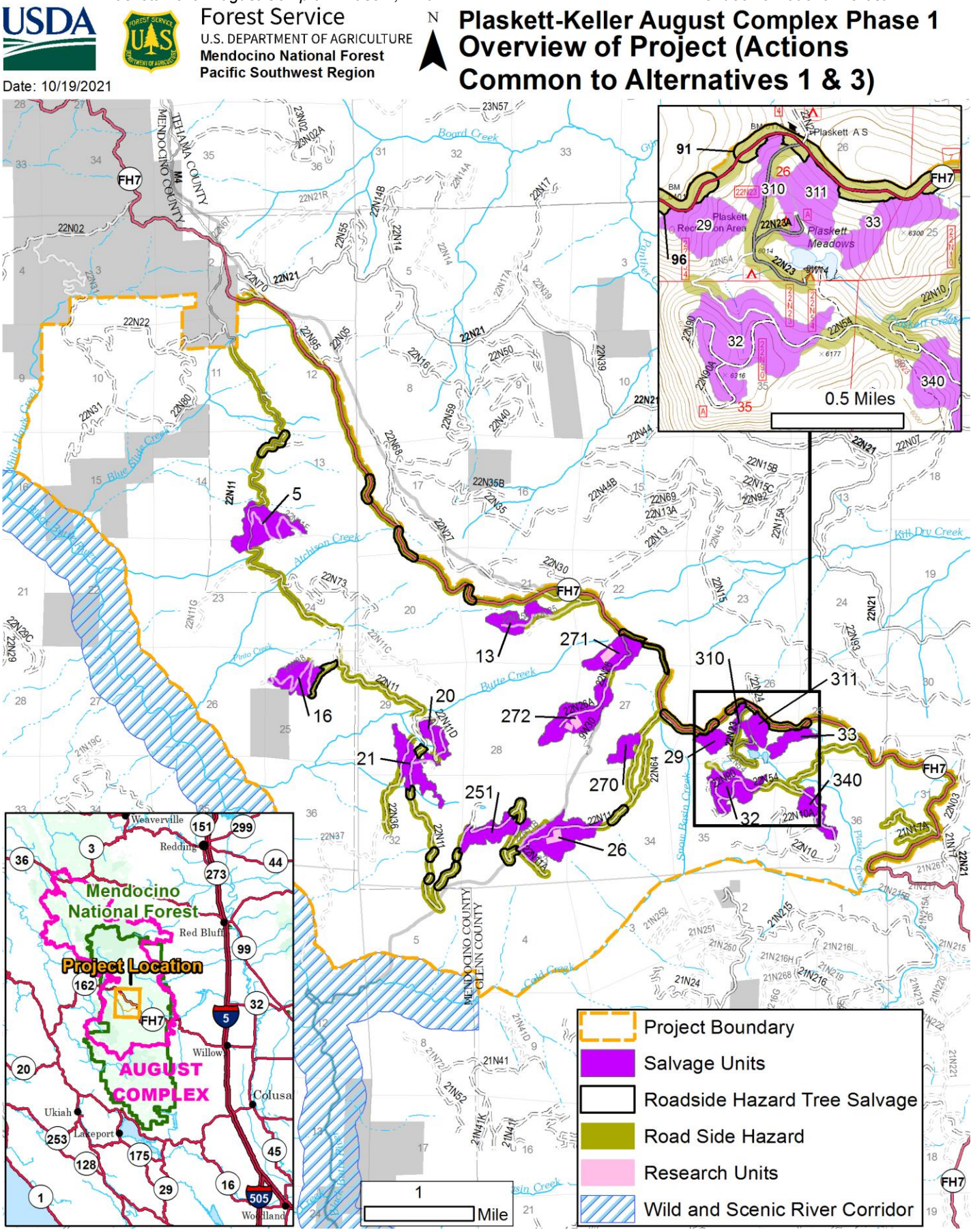


Figure 2. Vicinity and Project Map of the Plaskett-Keller Project

2. Need for the Proposal

Fire has always been a part of the Mendocino National Forest. Historically, low- to moderate-intensity wildfires tempered forest densities and allowed for a diversity of vegetative species at various stages of growth. This, in turn, supported an array of wildlife and forest uses. More recent fires, however, have burned hotter and consumed more acreage than ever recorded. The 2018 Ranch Fire and 2020 August Complex, for example, collectively burned 939,311 acres (87.6% of the administrative area) within the Mendocino National Forest. Almost half of those acres (423,850 acres) burned at a "high" severity classification, meaning 75 to 100 percent of vegetative cover was lost (see Figure 7).

In these severely burned areas, large swaths of trees across all species and age classes were killed. Too far removed from surviving trees that could aid in reforestation, these areas are unlikely to return to their prior states and provide the same ecological benefits to the wildlife and users who depended on them (North et al. 2019). Furthermore, a growing body of research shows that these severely burned areas, if left untreated, create conditions that fuel future high-intensity wildfires (Lydersen et al. 2019).

GTR-270, Postfire Restoration Framework for National Forests in California (USDA, 2021), concluded that "In California montane forests, shrub recruitment after high-severity fire is substantial, and the high flammability and continuity of postfire shrub-fields (also called montane chaparral) lead to a tendency for such sites to continue to support high-severity burning in subsequent fires. Such severe reburns can greatly inhibit conifer regeneration and lead to a persistent conversion away from conifer forest (so-called type conversion) (Coppoletta et al. 2016, Lauvaux et al. 2016, Tepley et al. 2017). This pattern is likely to be exacerbated as the climate warms and seasonal and annual droughts become more severe (Tepley et al. 2017, Welch et al. 2016)."

The Plaskett-Keller August Complex Phase 1 Project is being proposed as a first step, Phase 1, in response to the land management challenges caused by the August Complex., This project is also in line with several recommendations of the Bioregional Assessment of Northwest Forests (USDA, 2020c); *(6) recognize that fire is a natural process and plays an important role in reducing the risk of uncharacteristic fire and in promoting ecosystem health, (7) expand the use of timber harvest as a restoration tool to provide economic and social benefits to communities, (9) promote active management in plant and animal habitats to restore and encourage ecological resilience, and (10) recognize the social and economic benefits to communities and people from sustainable recreation opportunities.*

Note: While Phase 2 projects have not been explicitly identified, the Mendocino National Forest intends to pursue activities such as reforestation, terrestrial and riparian habitat improvements, non-commercial fuels reduction, and research. These activities would be analyzed separately from this project under NEPA. Recently, it has been more widely recognized that Mendocino's dry forest ecosystems deviate from the broader extent of other forests within the Northwest Forest Plan. As such, appropriate considerations will be made on where these restoration projects are most effective. The Forest may also use the General Technical Report-270 (Postfire Restoration Framework for National Forests in California) and other best available science to help finalize Phase 2 projects.

While this project is intended to be a first step in response to the August complex, it also meets resource direction set forth by Congress in the 1897 Organic Act, 1960 Multiple-Use Sustained-Yield Act, and 1976 National Forest Management Act. In compliance with the Code of Federal Regulations [36 CFR 220.7(b)(1) and 40 CFR 1508.9(b)], this section describes the needs for the project.

1. **To provide for employee and public safety in preparation for future reforestation activities and public use.**

   Proposed actions will target areas with high concentrations of fire-killed trees, as well as roadsides and facilities used by the public. Severely burned areas unlikely to naturally regenerate to a forested state will need future land management interventions, primarily in the form of reforestation. Removing fire-killed and -injured trees would make room for future seedlings, as well as to reduce the potential for trees falling and striking workers performing the reforestation activities. Similarly, removing fire-killed and -injured trees along roadsides and recreation facilities would reduce falling hazards posed to forest visitors.

Figure 3. Underburned large diameter snag and fir tree directionally felled following fire to avoid striking Forest Highway 7. Photo by Emily Dolhansky, 3/5/2021.

2. **To mitigate future wildfire severity by reducing dead fuel levels and effects to values at risk (including but not limited to: remaining green stands, water quality, wildlife habitat and wildland urban interface (WUI)) by reducing dead fuel loading and managing for stands that are more fire resilient. A fire resilient landscape allows for more successful and safe fire suppression responses and prescribed burning activities.**

   While dead trees are a natural part of the forest ecosystem, inordinate amounts of dead trees, either as standing snags or downed logs, can increase wildfire severity (Stephens et al. 2018). Meanwhile, severely burned areas that are not reforested tend to be replaced by shrubs and other low-lying vegetation that is more easily ignited by fire and susceptible to transferring wildfire from the ground to taller vegetation (Stephens et al. 2020). Reducing the concentration of standing dead trees reduces the risk of these trees falling and striking firefighters during future suppression activities. Placing treatment areas in locations that can strategically slow a wildfire's advance or diminish its intensity (such as a shaded fuel break along a ridgeline) can prepare the landscape today to better handle wildfire in the future (Collins et al. 2010).

Figure 4. Standing fire-killed trees and hazardous falling fire-killed trees in the project area near unit 272. Photo by Ryan Mikulovsky, 5/6/2021

3. **To contribute to the Forest Service's Congressional directive of furnishing a continuous supply of timber for the use and necessities of the people of the United States.**

   Since the establishment of the Nation's first national forest reserves, Congress has placed on the Forest Service the unique responsibility of furnishing a "continuous supply of timber for the use and necessities of the people of the United States" (Organic Act 1897). When not compromising the long-term sustainability of other natural resources, timber production is a recognized output of national forests (Multiple-Use Sustained-Yield Act 1960). Furthermore, revenue generated through commercial timber sales can be used to fund activities within the sale area that further ecological function and sustainability (National Forest Management Act (NFMA) 1976).

   Achieving land management objectives through timber sales is also prudent stewardship of taxpayer dollars. Removing trees is a time-consuming and labor-intensive endeavor. Similar activities (cutting, decking, or piling dead trees), that do not use commercial harvest can cost taxpayers several thousands of dollars per acre. . Making the trees available for commercial harvest not only frees up Forest Service staff time and financial resources, it supports the economic well-being of communities (NFMA 1976).

To reduce the concentration of fire-killed and fire-injured trees within the project area, Mendocino National Forest staff are proposing making a portion of the trees available for harvesting through a timber sale, a practice commonly referred to as "salvage logging." All the treatment areas exist on lands designated as available for harvesting and other silvicultural practices ("Matrix Lands") through the Mendocino Land and Resource Management Plan as amended with the Northwest Forest Plan (USDA 1995, pg. IV-38). Specialist reports in this environmental assessment detail the measures planned to protect natural resources likely to be impacted by the proposed actions.

Figure 5. Fire-killed stand of trees in unit 26.

This is representative of 75-100% basal area loss. Photo taken on 4/21/2021 by Ryan Mikulovsky.

4. **To further the scientific understanding of short- and long-term effects of salvage logging.**

The Mendocino National Forest is partnering with the Forest Service's Pacific Northwest Research Station to study the short- and long-term effects of salvage logging. Research plots randomly assigned throughout the project area will be used to compare revegetation and fuel accumulation among sites that were fully salvaged, partially salvaged, and not logged. Short- and long-term monitoring and reporting of these effects will provide land managers with a more robust understanding of the impacts of this practice.

Figure 6. Research crew taking plot measurements in the field

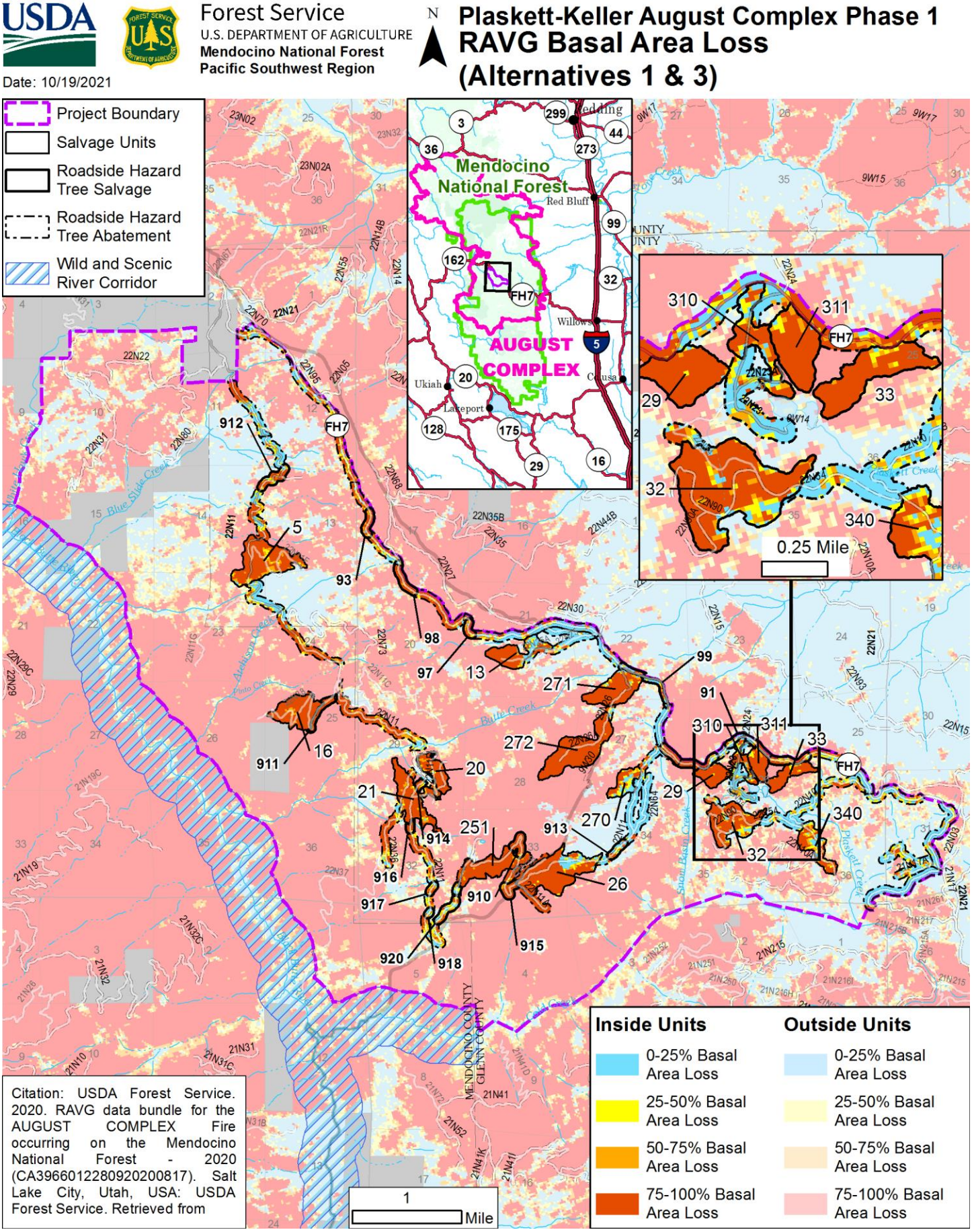


Figure 7. RAVG Basal Area Loss Classes (USDA Forest Service, 2020a) and Plaskett-Keller Project

3. Proposed Action and Alternatives

3.1. Proposed Action (Alternative 1)

Mendocino National Forest staff propose roadside hazard tree abatement and salvage of fire-killed and fire-injured trees using the "Marking Guidelines for Fire-Injured Trees in California" (Smith and Cluck 2011 (amended 2021)) and "Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region" (Angwin et al. 2012) in the Plaskett-Keller project area (see Figure 2). Fuels treatments for smaller trees and vegetation include thinning, piling, burning, chipping, and mastication.

All Late Successional Reserves (LSRs) will be avoided from any direct project activities. Salvage, hazard tree abatement, and fuels treatments will be performed only on lands designated as "matrix" within the LRMP as amended by the Northwest Forest Plan, meaning these areas are available for timber harvesting and other silviculture activities. Salvage units will focus on areas with high burn severity with a high chance of mortality.

Table 1 compares the Rapid Assessment of Vegetation Condition after Wildfire (RAVG)'s basal area loss for salvage and roadside units. The Silvicultural section of this EA describes the RAVG basal area loss product. Figure 7 shows the RAVG basal area loss classifications with project units. The RAVG product does not include the Soil Burn Severity (SBS) product, which is discussed in the hydrology and soils sections of this document.

For detailed maps of Alternative 1, see Figure 8 and Figure 9.

Table 1. Rapid Assessment of Vegetation Condition after Wildfire (RAVG) Basal Area Loss and Proposed Action Acres. Rounded to nearest whole acre.

RAVG Basal Area (BA) Loss Class (USDA Forest Service 2020a)	**Project Area Acres (%)**	**Salvage Units Acres (%)**	**Roadside Acres (Salvage) (%)**	**Roadside Acres (Fuels) (%)**
Unburned-Low Severity (0-25% BA loss)	3,147 (21%)	56 (6%)	39 (17%)	455 (46%)
Low Severity (25-50% BA loss)	1,472 (10%)	47 (5%)	23 (10%)	129 (13%)
Moderate Severity (50-75% BA loss)	1,396 (9%)	64 (7%)	30 (13%)	103 (10%)
High Severity (75-100% BA loss)	9,046 (60%)	777 (82%)	137 (60%)	304 (31%)
Total (acres)	**15,061 (100%)**	**944 (100%)**	**229 (100%)**	**991 (100%)**

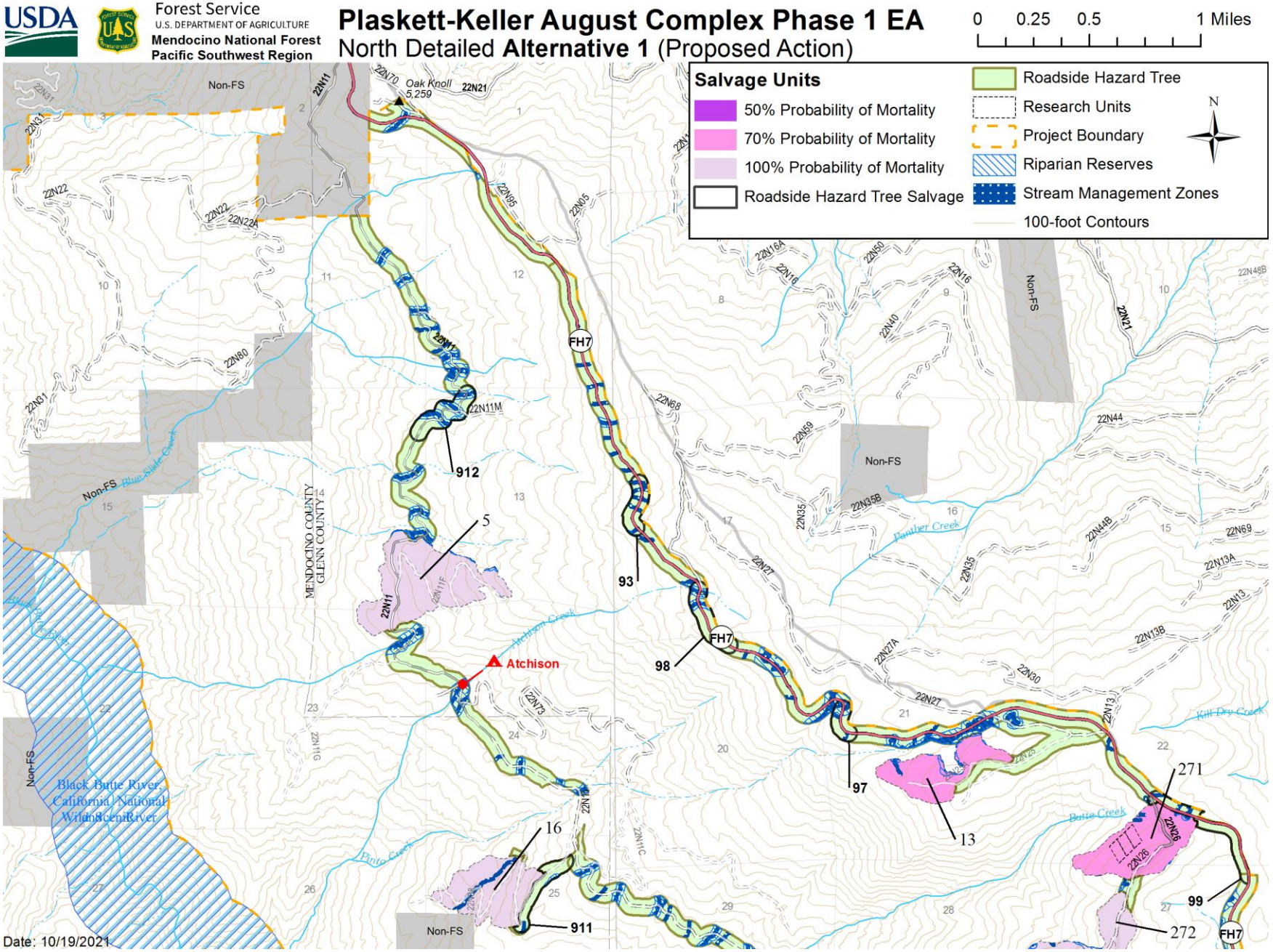


Figure 8. Proposed Action (Alternative 1), North

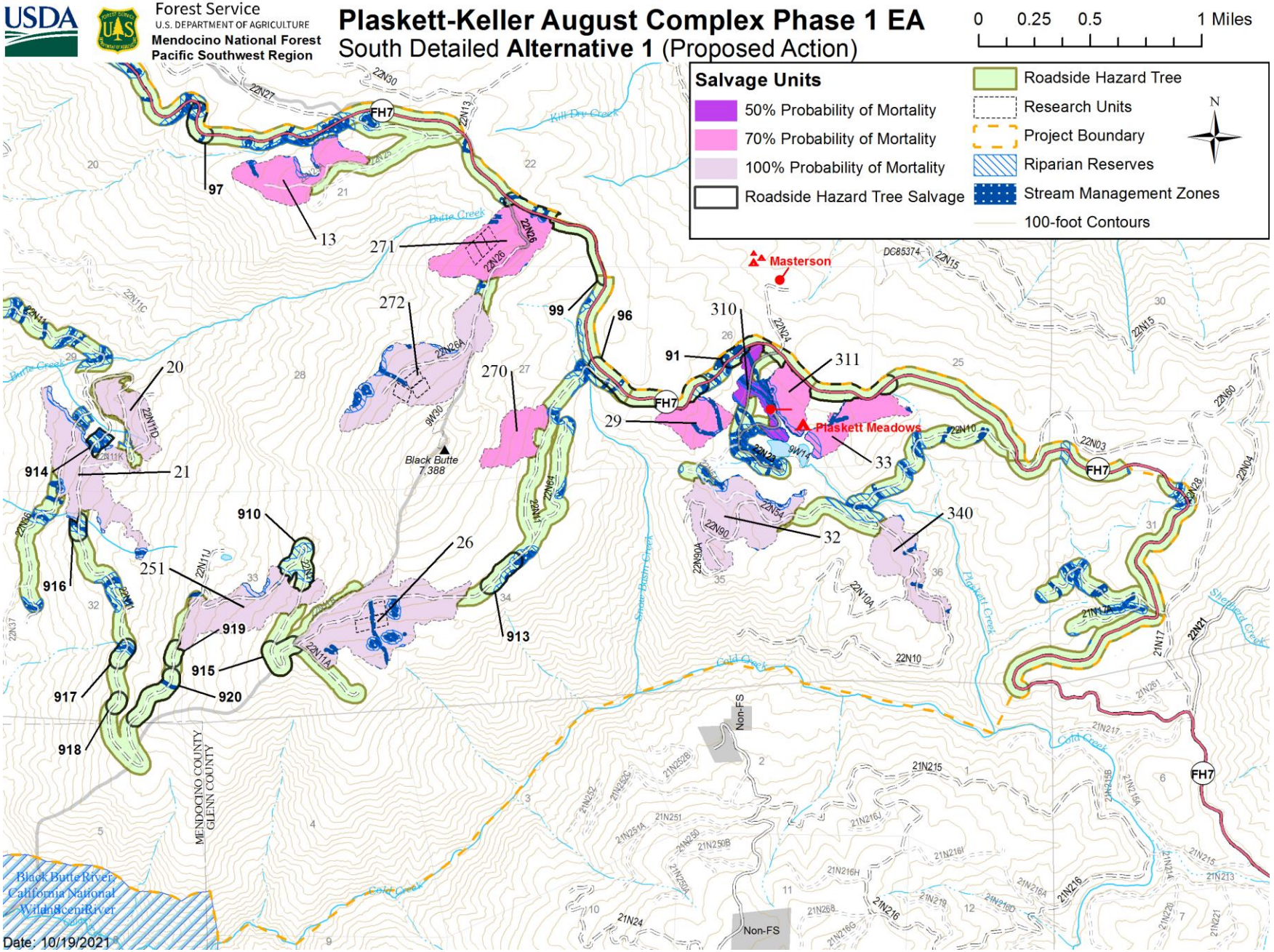


Figure 9. Proposed Action (Alternative 1), South

Salvage Units — 944 acres of salvage units are proposed. Merchantable dead and dying trees would be salvaged. It is a project objective to retain trees that are likely to survive without compromising public safety. The Forest Service would follow the Pacific Southwest Region's standardized report #RO-11-01, "Marking Guidelines for Fire-Injured Trees" (Smith and Cluck 2011). Different probabilities of mortality (Pm) would be used depending on proximity of salvage units to campgrounds, residences, or roads (for definition of Pm, see Silviculture section of this document). The logging system would be ground-based and may include tethered (winch-assisted) logging.

Unit 310 (Plaskett Campground) would receive the most intensive treatments due to long-term safety concerns for the public, Forest Service staff, and contractors. Trees would be marked at 50 percent probability of mortality to emphasize safety and limit the need for future removals at the highly used campground. The Plaskett Campground is ranked number three in terms of popularity of use on the Grindstone District during its camping season (Memorial Day through Oct 31).

Units adjacent to high-use areas, such as near FH7 (units 29, 33, 311), the Snow Basin recreation residence tract (unit 270), and popular dispersed use areas (units 271, 13), would be marked at 70 percent probability of mortality. This emphasizes safety and would limit the need for additional future removals. This treatment would achieve fuel reduction goals along ridgetops and in recreation infrastructure.

For the remaining interior units (5, 16, 20, 21,26, 251, 272), only merchantable trees that are 100 percent dead (i.e., completely scorched trees with no green needles) at implementation would be salvaged.

An estimated 2.5 miles of temporary roads (non-system roads) may be needed. Of the 2.5 miles of temporary road, 1 mile would be reconstruction of old temporary roads and up to 1.5 miles would be new construction. For maps of potential temporary roads in the project area, see Figure 26 and Figure 27 in Appendix A - Additional Maps. The temporary roads have been included as part of resource analyses and design features. They are typically restored and stabilized within one year of completion of implementation. While these locations are our best estimate, it is up to the purchaser and sale administrator to determine whether they are needed. Actual placement of the locations may vary slightly based on specific needs.

Potential landings have been identified and are included as part of resource analyses.

*Late Successional Reserve (LSR) disclaimer: In the process of finalizing the boundaries for the project on-the-ground, efforts were made to exclude all established 100-acre LSR boundaries from the proposed treatment. However, due to the inherent errors in precision and accuracy of GPS equipment, some unintended overlap occurred when tracking the map boundaries on the ground (see Appendix A, Figure 25). These errors are negligible in size (0.52-acre total), and our intent is to exclude salvage within those 100-acre LSR areas. Only unit 251 has 0.3 acres of intentional overlap with 100-acre LSR. Part of that unit's edge was placed along a pre-existing skid trail that is just inside the boundary of a 100-acre LSR. Trees do not need to be cut from the skid trail to use it. The ability to use the 280 feet of existing skid trail would help reduce ground impacts when accessing the unit.

Roadside Hazard — Mendocino National Forest staff will follow the Pacific Southwest Region's standardized report #RO-11-01 for "Marking Guidelines for Fire-Injured Trees in California" (Smith and Cluck 2011 (amended 2021)). Trees within the 70 to 100 percent mortality classes would be targeted for removal. Trees within striking distance of the road (typically 1.5 tree height or approximately 200 feet) will be targeted for removal. Staff will follow guidelines in the report #RO-12-01 "Hazard Tree Guidelines

for Forest Service, Facilities and Roads in the Pacific Southwest Region" (Angwin et al. 2012). Roadside hazard treatments would target forest roads heavily used by the public (e.g., FH7 and 22N11). These roads are used for travel and commuting purposes or lead to developed or undeveloped recreation sites. Approximately 30 miles of road are included in hazard tree abatement activities and account for about 1,220 acres of National Forest System lands. **Of this, 229 acres have been identified for roadside salvage. The remaining 991 acres would be treated through fuels treatment methods or biomass removal.**

Level 1 roads (USDA 2012a) would not be treated or used unless needed to access salvage units (units 5, 16, 21, 13, 26, 32). Maintenance level 1 roads are physically closed to motor vehicle use. These roads provide for long-term management access, but generally are not used on a daily basis. Level 1 roads leading into units 5, 13, 16, and 26 would require little to no tread work as they are currently passable and hydrologically stable. Level 1 roads leading into units 26 and 32 would require some tread work (grading, brushing, and filling of holes) for a logging truck. The level 1 road leading into unit 21 (22N11K) would require up to 0.5 mile of tread work to accommodate implementation activities. For maps of level 1 and higher roads in the project area, see Figure 26 and Figure 27 in Appendix A - Additional Maps.

Merchantable roadside hazard trees would be harvested using a ground-based logging system and may include tethered (winch-assisted) logging. Nonmerchantable material would be addressed using various fuels treatments (see below).

Fuels Treatments — Fuels treatment would include mechanical thinning (which includes mastication and biomass removal) and piling, hand thinning and piling, pile burning and understory burning. These activities would be performed within salvage and roadside hazard units and would help alleviate fuels buildup from any logging slash. Fuel accumulation would be reduced to no more than 10 tons/acre by removing merchantable timber and biomass and by burning slash piles.

Figure 10. Stand of relatively dense fire-killed small diameter trees in the project area. Photo taken by Frank Alves, March 2021.

Research — When the Mendocino National Forest Land and Resource Management Plan (LRMP) was written, its Appendix B listed some research and technical needs for the forest (USDA 1995, Appendix B, pp. B-1--B-3). Today we recognize those needs have changed and so we have included research for post-fire management. To promote research opportunities on the effects of large fires and post-fire management, this project proposes both current and possible future research.

One such research project is being developed by the Pacific Northwest Research Station (PNW) Pacific Wildland Fire Sciences Laboratory. This research will establish a replicated, longitudinal study investigating the effects of post-wildfire salvage logging and will include a series of permanent research plots. The research plan contains three prescriptions: RX1- passive management (control, no action), RX2- salvage activities from the proposed actions, RX3- removal of *only* small diameter trees (0- 20.9" DBH).

Research opportunities to study the effects of large, high-intensity fires and restoration treatments on wildlife, conifer seed dispersal, tree recruitment, soil erosion, and fuel accumulation are abundant within the August Complex Fire perimeter. If a salvage sale is unsuccessful, then a service contract or other means may be used to replicate salvage logging activities. Units with plots would be treated by deck/pile and burn, mastication, chipping or a combination of such activities.

Plots covering no more than 23.1 acres (total) will be set up within harvest stands to measure the effects of retaining various levels of standing dead trees within salvaged areas.

Design Features — In addition to the proposed action, design features and Best Management Practices (BMPs) have been developed to protect resources such as wildlife, hydrology, fish, soils, geology, cultural resources, and botany. For example, available slash will be used as surface cover (70 percent ground cover) to protect soil from erosion and to enrich it with organic matter. A full description of the project design features can be found in Appendix B. While design features are often seen as mitigation measures to address impacts from the project implementation, many of these design features are developed to prevent impacts. For example, identification of archaeological/heritage and unstable areas to avoid will protect these resources from any unintended project impacts.

3.2 Alternatives

3.1.1. Alternative 1

Alternative 1 is the **Proposed Action** described in section 3.1.

3.1.2. Alternative 2

Alternative 2 is the **No Action Alternative**. Under the No Action alternative, none of the Proposed Action activities would be implemented.

3.1.3. Alternative 3 – Modified Proposed Action

Alternative 3 (**Modified Proposed Action**) was developed in response to comments received during the 30-day comment period. Commenters requested retention of trees that have even a small chance for survival, regardless of extent of fire injury.

Alternative 3 contains the same unit boundaries and activities as Alternative 1. No changes are proposed to Unit 310 (Plaskett Meadows Campground) and interior units (5, 16, 20, 26, 251, 272). However, the probability of mortalities in other units are further refined to retain more burned trees while providing for hazard tree mitigation (safety) along major roadways and other high-use areas. Units near FH7 (units 29, 33, 311), the Snow Basin recreation residence tract (unit 270) and popular dispersed use areas (units 271, 13) would be marked at 90 percent Probability of Mortality (Pm) instead of 70 percent. However, areas of those units within 1.5 tree heights or 200' from only roads FH7 and 22N11 would remain at Pm70 to more effectively address safety along roadways. Since unit 13 does not abut FH7 and is downslope of FH7 it would remain entirely at Pm90.

For detailed maps of Alternative 3, see Figure 11 and Figure 12.

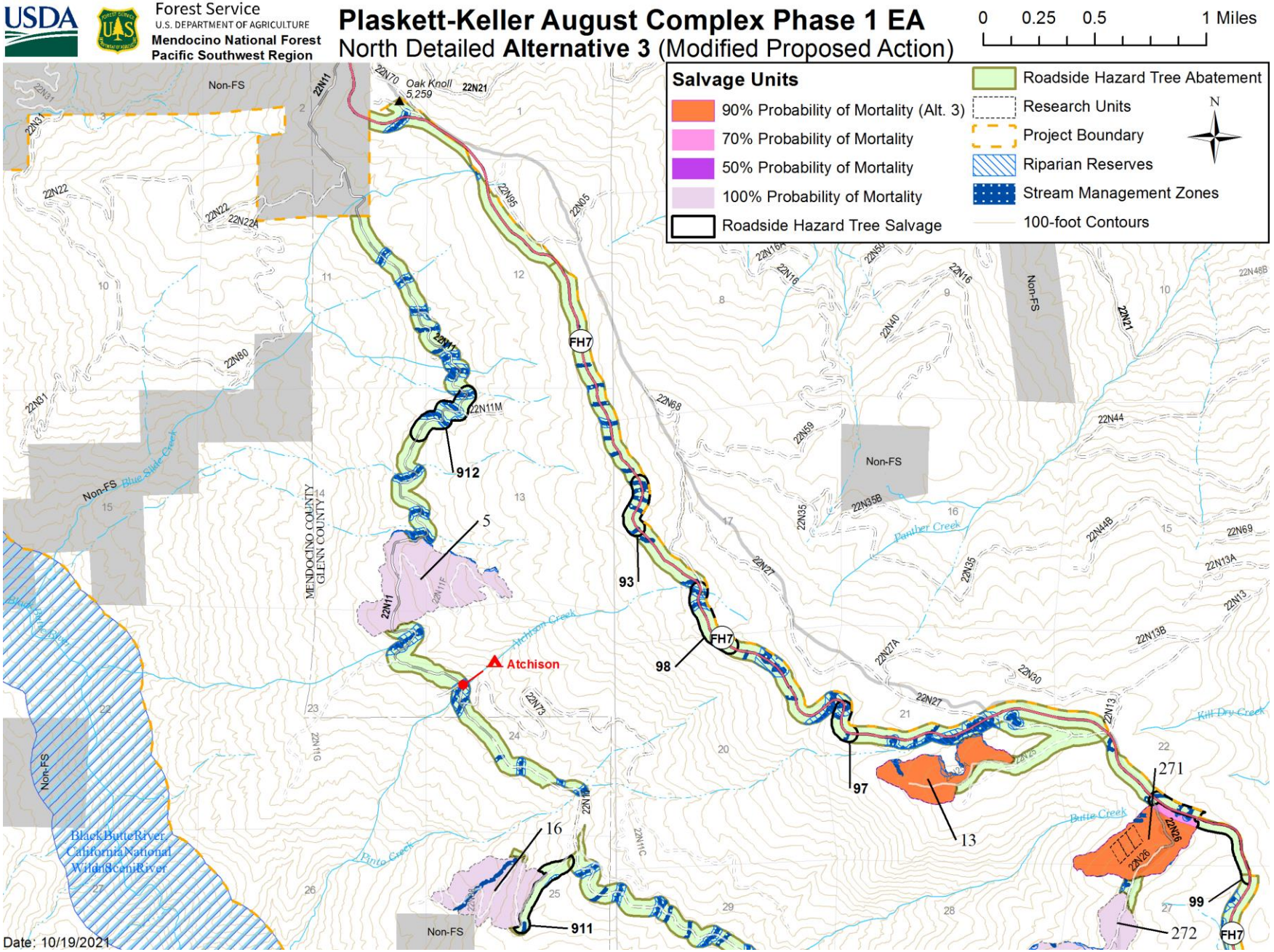


Figure 11. Modified Proposed Action (Alternative 3), North

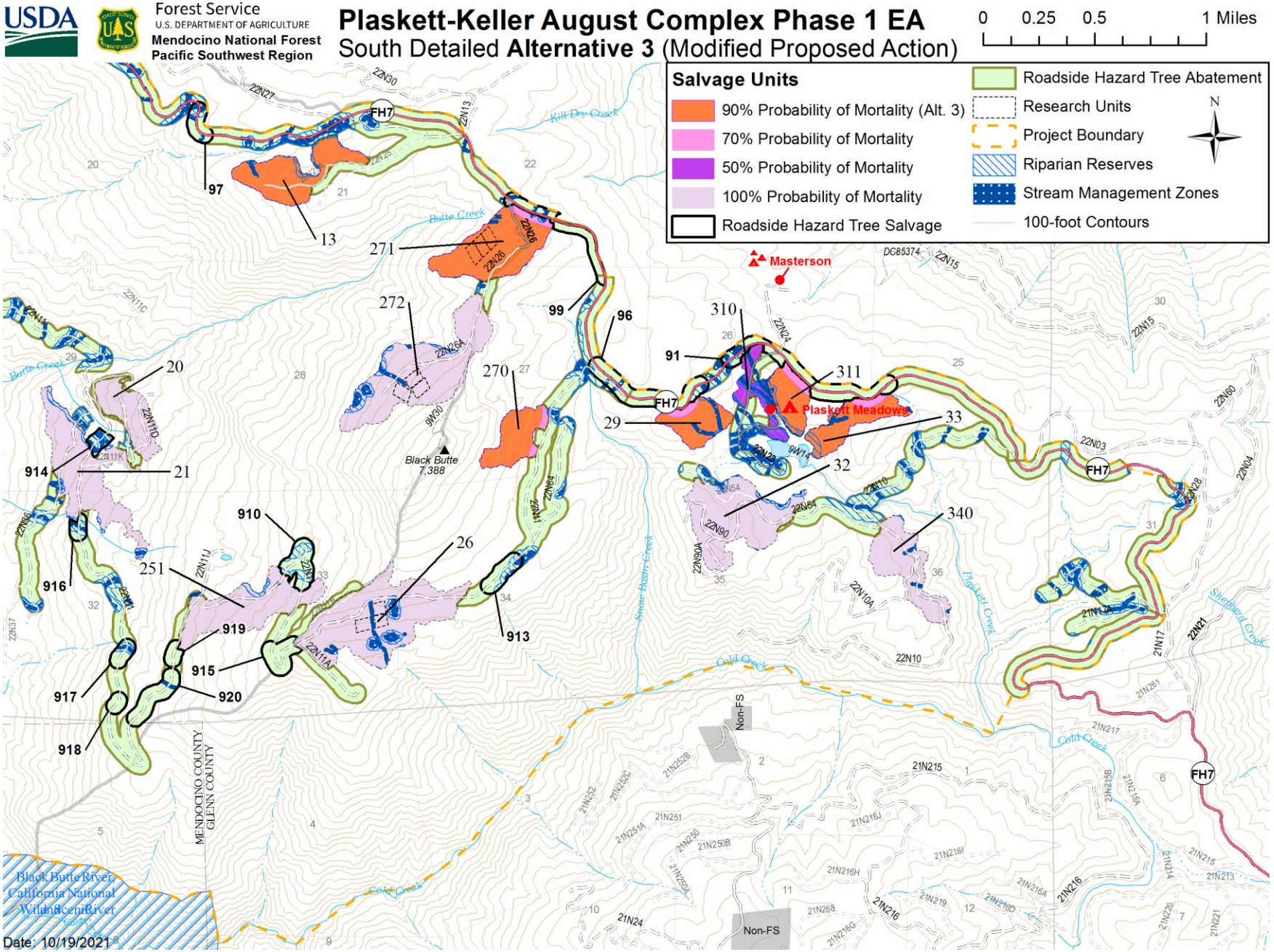


Figure 12. Modified Proposed Action (Alternative 3), South

3.3 Alternatives Considered but Eliminated from Detailed Study

Removal of timber from roadside and campgrounds ONLY

This proposal came from initial project scoping, with a request to look at removing timber only from roadside and campgrounds. While this alternative would address most of the safety aspects of the purpose and need (No. 1), the interdisciplinary team did not think it adequately addressed safety needs of firefighters or individuals conducting future reforestation activities in areas away from roadsides or recreation sites. Limiting available timber for harvest to only roadsides and recreation areas would also decrease the likelihood of a viable timber sale, thereby negating purpose and need No. 3: recovering the economic value of dead and dying trees. Limiting the project area to only roadsides and campgrounds also would not allow enough area for appropriate statistical design of research plots supporting purpose and need No. 4. Furthermore, the research design requires untreated plots to serve as a "control" for comparison. This would mean pockets of roadside and campground hazards would be left on landscape.

Diameter Limit

A diameter limit was proposed by two respondents during scoping of this project. One respondent proposed not harvesting any trees larger than 14 inches diameter at breast height, while the other proposed that a limit be set at 20 inches diameter at breast height. Under these proposed alternatives, safety issues raised in purpose and need Nos. 1 and 4 would not be addressed since there are dead and dying trees above those diameter limits. This would be acutely problematic considering the number of high-use recreation sites within the project area: two campgrounds, one day-use area, four nonmotorized trails, a recreation tract, and a number of popular dispersed camping areas. Furthermore, removing only smaller-diameter trees would not abate future fuel buildup concerns expressed in purpose and need No. 2, nor would it create a realistic sale to recover economic value of dead and dying trees as desired in purpose and need No. 3. Collections from a timber/salvage sale can be used to fund future restoration projects.

Researchers from the Pacific Northwest Research Station (PNW) Pacific Wildland Fire Sciences Laboratory, for the purposes of their larger study across multiple forests, have included a 20.9-inch diameter limit as one of their research design blocks (see Proposed Action, Research section) to measure the efficacy of a diameter limit on future fuels buildup.

4. Environmental Impacts of the Proposed Action, No Action Alternative, and the Modified Proposed Action

This section summarizes the potential impacts of the proposed action and no action alternative for each impacted resource. The following table summarizes and compares effects to considered resources.

Table 2. Comparison of alternatives and their effects to the listed Resources.

Resource	Proposed Action	No Action	Modified Proposed Action	Notes
Aquatics	No mechanical vegetation management activities are proposed adjacent to fish-bearing stream channels; therefore, no direct effects are expected on anadromous fish. There is a risk of sediment reaching the stream as an indirect effect, due to ground disturbance from heavy equipment, in addition to potential sedimentation due to fire effects. This may cause an impact to coho critical habitat and Forest Service Sensitive species. BMPs and Design Features would minimize or prevent indirect and cumulative effects. The Black Butte Wild and Scenic River Corridor and its outstandingly remarkable values of fish population and fish habitat would be negligibly impacted.	The "no action" alternative would result in no direct or indirect effects to anadromous fish, coho or steelhead critical habitat, or Forest Service Sensitive Species. No timber would be removed, and no heavy equipment would be used for timber operations; therefore, no direct or indirect effects would occur from vegetation management in the Action Area. Sedimentation in streams would occur due to effects of fire.	Since there are no changes to the unit boundaries and activities, effects under the modified proposed action would be the same as the proposed action.	For Threatened, Endangered, Proposed, Candidate Species and their designated critical habitat, determination of 'May affect, not likely to adversely affect.' For NC Steelhead and 'No Effect' for SONCC Coho and CC Chinook salmon. For Forest Service Sensitive Species, determination of 'May affect individuals, will not affect the population.' Indirect effects of sedimentation that could occur as a result of proposed action are only slightly over those of the no action alternative.
Botany	One Sensitive plant species was found within the project units, but it is unlikely to become impacted due to its location. There is a potential for invasive species to spread into areas currently free of invasive species. These impacts would be mitigated by the invasive species treatment program currently in place on the MNF, where removing invasive species from special-status plant	Under the no action alternative, no project-related ground disturbing activities would take place. This alternative would, therefore, have no direct or indirect effects on Forest Service Sensitive or Survey and Manage plant species. Invasive plants would not spread as a result of Proposed Action activities, but	Effects for the modified proposed action would be similar to Alternative 1 (proposed action) since the unit boundaries and actions remain the same.	There are no suitable habitats or occurrences of federally listed plants (Threatened, Endangered, or Proposed) within proposed units. Thus, the Proposed Action and No Action alternatives would not affect these species.

Resource	Proposed Action	No Action	Modified Proposed Action	Notes
	species occurrences is a high priority.	may still slowly spread due to general road use and recreation.		
Fuels	The proposed action has the ability to reduce future fuel loads to manageable levels; reducing fuel loads ultimately reduces fire behavior. Projections of surface fuel loading (through year 2071) from Forest Vegetation Simulator (FVS) are at 1.75 to 9.02 tons/acre.	No treatments would occur. Initially, lack of fuels in the burned area generally would not support large high intensity wildfires. As fire-killed vegetation falls into a growing volume of live vegetation, wildfires are expected to grow in intensity, size, and suppression difficulty. Projections of surface fuel loading (through year 2071) from FVS are at 1.73 to 82.59 tons/acre.	Modeled fuel loading is the same in alternatives 1 and 3 (Table 4). Under the modified proposed action (Alternative 3), the fuel loading is expected to be higher than under Alternative 3. This discrepancy is an artifact of fuel modeling; fuel modeling in FVS was conducted only on trees that were dead at the time of plot set-up.	
Geology	The treatment units were planned to avoid known and suspected unstable areas. There are possible benefits of salvage logging trees and hazard tree abatement. Removal of dead trees can reduce uprooting, which would cause localized instability to soil and slopes. Watershed geologic resources of the Black Butte Wild and Scenic River Corridor would be negligibly impacted.	Slopes would not be disturbed by heavy machinery and surface flow-paths would not be altered. Trees may topple as their roots decay, creating large root holes that may concentrate water and result in mass wasting. Fuels loading would be higher than in the proposed action's activity unit areas. Higher fuel loading could result in high-intensity wildfire, killing regrowth, and possibly increasing the risk of slope failures.	Effects would be nearly the same as those under Alternative 1 as units and activities are the same, although with slightly less intensive salvage for units in high use areas. Windthrow may be more common with more remaining trees that are weak or may die but most units with the modified Pm are on gentle ground where uprooting trees would not impact slope stability.	
Heritage	The proposed action would have no effect on heritage resources, as all known sites would be protected. Intensive surveys were completed during the summer of 2021. Heritage resources of the proposed	The no action alternative would not affect heritage resources.	Effects of the modified proposed action are the same as the proposed action (i.e., no effect).	

Resource	Proposed Action	No Action	Modified Proposed Action	Notes
	project area and the Black Butte Wild and Scenic River Corridor would not be impacted.			
Hydrology	Soil disturbances could temporarily reduce watershed condition. Cumulative Watershed Effects modeling shows that Atchison is the most impacted watershed (see Notes column). It would have an Equivalent Roaded Acre of 1,303. Threshold of Concern is set at 429 for this watershed.	Sedimentation from roads would continue and forest material would further accumulate. Cumulative Watershed Effects modeling shows that the most impacted watershed (Atchison) would have an Equivalent Roaded Acres of 1,209. Threshold of Concern is set at 429 for this watershed.	Effects would essentially be the same as Alternative 1 since units and activities remain the same. However, negative impacts (although immeasurable) may be reduced since fewer trees would be removed.	As shown in Table 9 (CWE table from hydrology section), project treatment ERAs and % ERAs are quite small compared to the total number of ERAs in either alternative, due to the background post-fire condition. This indicates that the Proposed Action would not lead to substantive differences in cumulative watershed effects when compared with the no action alternative. Erosion and sedimentation with the proposed action would be very similar to those due to the fire (i.e., the no action alternative).
Recreation/ Visuals	Users would be affected by short-term disruptions and displacement during project implementation. However, the Proposed Action would decrease the short- and long-term road maintenance needs within the project area. Recreation Opportunity Spectrum (ROS) classifications would not change. Minor localized short-term direct	Public safety closure order 08-20-15 would remain in place and additional closures would be expected annually as hazards are evaluated. Road, trail, and facility maintenance costs would increase under this alternative. Road and trail closures would occur to address hazard trees. ROS Classifications would not	Effects under this alternative would be similar to Alternative 1. While fewer potential snags within the interior would be removed, safety would still be addressed along roads and developed recreation areas. However, potentially more snags and falling trees would reduce opportunities for safe dispersed	

Resource	Proposed Action	No Action	Modified Proposed Action	Notes
	effects to VQOs would result during project implementation (e.g., presence of equipment, smoke, stumps, exposed soils, and cut and/or piled vegetation). "Greening up" for three to five years after project completion would reduce visual evidence of fuels, roadside hazard, and site prep/plant activities to acceptable levels. Mitigating tree hazards is necessary to continue to provide public access and recreational opportunities.	change. While there would be no effects to the VQOs, changed conditions associated with the fire would remain and would change (improve) slowly over time.	recreation and camping in units 13, 29, 33, 270, 271, and 311.	
Silviculture	The Proposed Action primarily targets dead trees. Live trees that would be subject for removal are identified based on their probability of mortality and potential to become a safety hazard. Removal of live trees may potentially decrease the available seed source, at the same time lowered tree density would free up available resources (water, light, nutrients) for the remaining living trees. Removal of dead and dying trees would decrease the potential for beetle outbreak in the area. If implementation is delayed, mechanized equipment has the potential to disturb recovering vegetation, including trees. Soil disturbed by mechanized equipment might provide better germination conditions. Studying	Falling snags might impact recovering vegetation. A large number of tree trunks on the ground would interfere with establishment of tree seedlings. The fuelbed would have a detrimental effect on recovering vegetation in case of fire.	This alternative would retain a greater number of trees with some chance of survival. Surviving retained trees would potentially provide additional seed and shade, while dying trees would become snags.	Successful future reforestation efforts (future phases of Plaskett-Keller project) depend on adequate site preparation – and would require removal of standing dead and downed trees. The proposed action provides the most economical way of accomplishing goals of public access and safety, recreational opportunities, and future reforestation.

Resource	Proposed Action	No Action	Modified Proposed Action	Notes
	the effects of salvage logging would greatly improve our understanding of fuels and vegetation responses to timber operations on a localized scale.			
Soils	The project has little potential to create impacts of a degree or extent to consider detrimental or adverse to the soil resource. The main potential soil impact is for erosion exceeding the natural rate. However, soil cover in the form of project-generated woody debris and project integrated design features would prevent that from occurring. Additionally, soil cover generated through the project would lower the Erosion Hazard Rating throughout implementation units (Soils Report, table 3).	There would be no direct effects on the soils as soil-disturbing project activities would not take place. Indirect effects would be the continued short-term erosion hazard, particularly for areas with moderate and high soil burn severity. As vegetation recovers, needles drop, and woody debris falls to the soil surface, the erosion hazard would decrease. In the long term, areas with moderate and high soil burn severity would have high fuel loadings, with a corresponding elevated hazard of detrimental soil effects in the event of another wildfire.	Effects under this alternative would essentially be the same as under Alternative 1 since unit boundaries and activities remain the same. However, there may be lesser negative impacts (though immeasurable) since fewer trees would be removed.	
Wildlife	There is potential for direct and indirect impacts to one Threatened wildlife species. Proposed treatments would occur adjacent to and within suitable Northern Spotted Owl (NSO) habitat. Removal of trees with less than 70-100% probability of mortality in treatment units with suitable habitat would result in an adverse effect via removal or downgrade of habitat. By definition, any removal or downgrade of suitable habitat is	Taking no action in the short term would result in no direct effects to listed, proposed, or sensitive species or habitats pertaining to these species. No potential human-caused disturbance would result due to a lack of proposed management. The no-action alternative would maintain current habitats in existing conditions and trends. There would be no immediate	The effects of Alternative 3 are the same as Alternative 1 for wildlife since the amount of suitable habitat to be modified or removed would be the same for the Northern Spotted Owl and its critical habitat. There may be lesser negative indirect impacts to sensitive species including marten, fisher, wolverine, bat species and goshawks since fewer trees would be removed.	For Forest Sensitive wildlife species and their habitat impacted, a determination of a "May affect, but is not likely to result in a trend toward Federal listing or loss of viability."

Resource	Proposed Action	No Action	Modified Proposed Action	Notes
	considered an adverse effect. However, no take of any owl is expected. As such a minimal number of trees potentially would be removed from suitable habitat, the removal would not be detrimental in comparison to remaining habitat across the forest landscape. 1.22 acres of suitable habitat would be potentially removed/ downgraded, which is 0.1% of suitable habitat in the action area. Design criteria and limited operating periods for nesting/ roosting and active Activity Centers would ensure that no breeding or nesting disturbance would occur. Physiological and biological features (PBFs) of critical habitat fall into multiple treatment units. However, PBFs will not be removed or downgraded since only trees with 70-100% probability of mortality would be removed in those units. Treatment of trees could occur directly adjacent to PBFs resulting in a modification of surrounding areas. Any owls utilizing PBFs would likely migrate through and use burned landscape adjacent to PBFs. PBFs would not be removed, however modification of habitat could occur depending on removal	change in snag density or recruitment of large snags. In addition, current conditions would remain, no habitat disturbance would occur, and non-native invasive plant species would continue to reduce diversity, thus reducing the quantity of suitable habitat. However, without treatment and in the long term, fuels levels would increase due to fire-killed trees falling, resulting in larger re-burn potential. This may cause removal and downgrading or loss of suitable habitat.		

Resource	Proposed Action	No Action	Modified Proposed Action	Notes
	of hazard trees in close proximity. Therefore, the proposed action "may affect, but not adversely affect" designated NSO critical habitat.			

4.1. Aquatics

The project area is within the distribution range and habitat is present for the **Southern Oregon/Northern California Coasts (SONCC) Coho salmon, California Coastal (CC) Chinook salmon and the Northern California (NC) Steelhead**; therefore, these species will be further discussed in this analysis, and the effects of proposed actions on these species and their critical habitat will be considered.

The Plaskett-Keller project area is nearly completely contained within the Black Butte River watershed (HUC 10). The Black Butte River system provides 31 miles of Endangered Species Act (ESA) designated critical habitat and 9 miles of additional habitat for Northern California Steelhead trout, Southern Oregon/Northern California Coho salmon, and California Coastal Chinook salmon. While only one fish bearing stream (non-anadromous) intersects the proposed salvage logging units (Plaskett Creek), there are three additional fish bearing streams adjacent and downstream of proposed logging units: Cold Creek, Atchison Creek, and Butte Creek. These streams provide 1.5, 1.0, and 0.25 miles of anadromous habitat and 9.3, 3.2, and 4.0 miles of resident rainbow trout habitat, respectively, downstream of proposed salvage units.

The Black Butte watershed is designated as a Key Watershed. These were intended to serve as refugia for aquatic organisms, particularly in the short term for at-risk fish populations, and had the greatest potential for restoration, or to provide sources of high-quality water. At the time the NWFP was drafted, Tier 1 key watersheds (such as the Black Butte) had strong populations of fish, productive habitat that was in good condition, or high restoration potential (Spies et al. 2018).

The Black Butte River watershed supports two species of salmonids, chinook salmon (*Oncorhynchus tshwytscha*) and steelhead trout (*Oncorhynchus mykiss*). Both species are federally listed as “threatened” under the ESA. The chinook run typically begins in October or November, and steelhead typically enter the river in December or January. The Black Butte watershed also supports stable, self-sustaining populations of resident rainbow trout (*O. mykiss).* Critical habitat for SONCC coho salmon was broadly designated on the MNF. Coho critical habitat extends up Black Butte River and into its tributaries, although there is no documented coho population there. Records indicate that the nearest coho population is more than 40 miles downstream in the area of Outlet Creek (USDA 2012b). We have no documented occurrence of coho salmon in the Black Butte River. This is believed to be because summer water temperatures exceed those preferred by coho for summer rearing.

In general, chinook salmon are considered to be mainstem channel spawners. They typically spawn in adequate gravel areas located in the main river channel and only occasionally spawn in smaller tributaries. Steelhead typically spawn further up the watershed and in smaller tributaries (Groot and Marcolis 1991).

Two Forest Service Sensitive (FSS) fish species have been found in these watersheds: Pacific lamprey and western brook lamprey. Both Pacific and western brook lamprey in California are dependent on cool to cold water streams; lamprey larvae are documented as preferring water temperatures less than 20°C (68°F) and having metabolic problems at higher temperatures. Pacific lamprey are known to exist in the Middle Fork Eel system, and have been documented to occur in very small number in the Black Butte River (USDA 1996). Western brook lamprey have not been documented in the Black Butte River, although suitable habitat is present in large pools in the mainstem river and its tributaries. The high quantity of fine sediment present throughout the Black Butte River suggests that the lamprey may be present but no surveys have been conducted to confirm presence or absence from the system.

4.1.1. Environmental Consequences

Proposed Action

No mechanical vegetation management activities are proposed to occur adjacent to fish-bearing stream channels; therefore, no direct effects are expected on anadromous fish from the implementation of the Plaskett-Keller project. No culverts crossing fish-bearing streams are proposed for removal or replacement, further reducing the risk of direct effects to fish.

There would be no loss of riparian vegetation in the action area due to the SMZ buffers in place and the effectiveness of BMPs in relation to timber harvest. The exclusion zone along streams will restrict mechanical equipment from within 50 feet of the streambank which would prevent impacts to riparian vegetation.

There is a risk of sediment reaching the stream due to ground disturbance from heavy equipment. Rubber tired skidding has the highest potential to cause detrimental ground disturbance because of multiple passes over the same ground. Multiple passes by heavy equipment over the same ground can lead to detrimental soil compaction, which has a low filtration rate, and can lead to the erosion of bare soil and sedimentation introduce to the watershed. Heavy equipment would not be allowed closer than 50 feet from stream channels, which should provide an adequate buffer to intercept and assimilate any sediment produced by vegetation management (see Design Features Appendix B). This is particularly true on slopes with lower angles (<15%) that typically occur next to the stream. Lower angled slopes deliver less sediment through a buffer than higher angled slopes (Elliot et al. 2010).

Operation of biomass and mastication equipment has a lower potential for soil compaction and sediment production. This is because they have much lower ground pressure and do not make multiple passes over the same ground. These are generally tracked vehicles that spread their weight out over a larger area and do not cause large areas of bare soil. Further, mastication equipment would spread the shredded material over the ground, thereby increasing ground cover and reducing erosion potential. As previously noted, increasing ground cover is an effective way to minimize erosion from vulnerable areas.

The proposed road actions have the potential to affect fish habitat through physical disturbance and sedimentation of habitat. The roads in the project area are typically outside of riparian reserves with the exception of stream crossings. Stream crossings are the areas with the highest risk of impacts to anadromous habitat in the project area. The proposed actions for roads would be confined to the existing road prism, especially at stream crossings; therefore, the risk of mortality or injury to individuals would be discountable.

The Project area is in the geographic range for the **CC Chinook salmon ESU**, **SONCC Coho salmon ESU, NC Steelhead DPS.** It is well understood that though critical habitat is present for SONCC Coho salmon the BBR does not support a population of this species. CC Chinook is known to inhabit the BBR but as mainstem spawners they are well removed from the project implementation units. Therefore, it has been determined that the Plaskett-Keller August Complex Phase 1 Project will have "**No Effect**" on the CC Chinook salmon ESU, SONCC Coho ESU, and their respective critical habitats. NC Steelhead are known to spawn higher in the watershed and its tributaries of the mainstem BBR. Although low, there is a risk some temporary increased sedimentation could reach these habitats as a result of this project. Therefore, it has been determined that this project "**May affect, Not Likely to Adversely Affect"** the NC Steelhead DPS and its critical habitat.

The Black Butte Wild and Scenic River Corridor and its outstandingly remarkable values of fish population and fish habitat would be negligibly impacted.

Cumulative Effects

The Cumulative Watershed Effects analysis (see Hydrology Report) calculated from all alternatives proposed in this project do exceed each watershed's Threshold of Concern. While some alternatives may have less of a cumulative effect, there may be negative indirect effects as a result. The no action alternative has the least cumulative effects, but is the most susceptible to possible future catastrophic wildfires due to heavy fuel loads. The proposed action will have slightly more cumulative effects, but will have the most impact in reduction of fuels; thus reducing the possibility of catastrophic wildfires or reburns in future years.

Cumulative effects analyses for T&E aquatic species are only triggered in Section 7 consultation by a determination of adverse effects. Under ESA, those effects would only be reasonably foreseeable effects of nonfederal activities. Cumulative effects are not considered in the effects determination concerning jeopardy of adverse modification of designated critical habitat. Since no adverse effects are anticipated, no discussion of cumulative effects is warranted.

No Action

Implementation of the "no action" alternative would result in no direct or indirect effects to anadromous fish or coho critical habitat. No timber would be removed and no heavy equipment would be used for timber operations; therefore, no direct or indirect effects would occur from vegetation management in the Action Area.

The current dead and dying trees will fall and contribute to increased ground fuel recruitment. A continued recruitment of fuel would allow the fuel load to increase and elevate the risk of a catastrophic wildfire to occur. A large-scale fire with areas of moderate and high severity post-burn conditions could result in significant changes to riparian and stream habitats. These changes include loss of riparian vegetation, loss of canopy cover and the denuding of ground cover that may lead to increased erosion and sedimentation. A high intensity fire in the project area could result in an increase in sedimentation and changes in the riparian habitat that could reduce/not change the habitat suitability for many years (5-10). High severity fires that burn with high temperatures and to a greater extent across the landscape remove vegetative cover and often leave bare mineral soil that is vulnerable to erosion and sedimentation (Arkle and Pilliod, 2010). Compared to the proposed action, the risk of impact to riparian vegetation and instream habitat from a wildfire would be higher because of the continued increase in the fuel load.

Modified Proposed Action

Since the modified proposed action does not change the harvest unit boundaries or implementation methodology the effects on aquatic resources will be the same as from Alternative 1 (Proposed Action).

4.2. Botany

Mixed conifer and fir forests dominate the higher elevations, while montane hardwoods and chaparral dominate in lower elevations. The area burned patchily during the 2020 August Complex Fire, but over one third of the project area burned at high severity, resulting in near-complete basal area loss. There are no mapped areas of serpentine bedrock/soils within the Plaskett-Keller project area.

According to the US Fish and Wildlife Service, possible federally listed plant species in the project area include the Endangered *Lasthenia burkei* (Burke's goldfields), *Lasthenia conjugens* (Contra Costa goldfields), and *Trifolium amoenum* (showy Indian clover).

There are four previously known occurrences of Forest Service Sensitive species within the project area: two occurrences of *Cypripedium fasciculatum* (clustered lady's slipper) and two occurrences of *Cypripedium montanum* (mountain lady's slipper). These two orchid species are also Survey and Manage plant species. These occurrences are near, but not within roadside or salvage units. As part of the project survey, these mapped occurrences were revisited and carefully inspected for the target species. The species were not found at any of the mapped locations, which may have been due to the high burn severity, which could have killed the plants completely or damaged the plants enough that they remained dormant underground (individuals of these orchid species are known to occasionally remain below-ground for a year even without fire). So while it is possible that the occurrences were extirpated by the August Complex, it is also possible that they will emerge in a future year. What this means for the Plaskett-Keller project is a caveat regarding botanical surveys: there may be species present (underground) that cannot be detected this year. However, waiting another year to conduct more surveys is beyond the timeline of this project, and the analysis was conducted with the current data. A complete list of sensitive plan species for the Mendocino National Forest can be found in the Botany Report.

Invasive Plant Species- The botanical surveys in roadside and salvage units also included surveys for invasive plant species. Based on these and previously mapped infestations, there are 55 mapped locations of 7 different non-native invasive species within the Plaskett-Keller project area. These sites comprise a total of 173.5 acres; see Table 3)

Table 3. Summary of invasive species found within the Plaskett-Keller Project.

Species	Common Name	# of Sites	Acres
Centaurea solstitialis	yellow starthistle	15	41.9
Centaurea diffusa	diffuse knapweed	1	2.1
Cirsium arvense	Canada thistle	2	2.7
Cirsium vulgare	bull thistle	8	51.3
Hypericum perforatum	klamathweed	6	24.6
Elymus caput-medusae	medusahead	2	12.8
Verbascum thapsus	wooly mullein	21	38.1
TOTAL		**55**	**173.5**

4.2.1. Environmental Consequences

Proposed Action

Direct effects involve physical damage to plants or their habitat. Tree harvest and fuels reduction operations have the potential to directly affect plant species, resulting in death, altered growth, or reduced seed set through physically breaking, crushing, burning, scorching, or uprooting plants.

Indirect effects are separate from an action in either time or space. These effects, which can be beneficial or detrimental to special status species and invasive plant species, may include changes in plant community composition or availability of suitable habitat. Tree removal operations have also been shown to impact pollinator abundance and species, which may have an indirect negative impact on both special status plant species and invasive plant species (Jackson et al. 2014, Newton et al. 2018).

Current inventories of Sensitive plant species capture the impact of past human actions and natural events, and are therefore implicit within the existing conditions. Cumulative effects could occur when the direct and/or indirect effects of one of the action alternatives on a given species add incrementally to the effects of past, present, and reasonably foreseeable future actions.

Threatened, Endangered or Proposed- There are no previously known occurrences of federally Threatened, Endangered, or Proposed plant species within the project area. Thus, the three species listed above (Burke's goldfields, Contra Costa goldfields, and showy Indian clover) will not be affected by the Proposed Action and no action alternative.

Forest Service Sensitive- Project surveys found one occurrence of the Sensitive species *Anisocarpus scabridus* (scabrid alpine tarplant) within a proposed roadside unit along the 22N11. The site, which is on Plaskett Ridge just south of Black Butte, is flagged for avoidance. However, because the trees in the immediate vicinity of the plants are still mostly green and would, therefore, not be considered hazards, it is unlikely that there will be direct impacts to the species by roadside hazard abatement activities.

Indirect effects of the proposed action could occur due to the spread of invasive species that is likely to occur as a result of the proposed action. Invasive plant species can outcompete and displace native plant species (Pimentel et al. 2001, USDA 2013). The *Anisocarpus scabridus* occurrence is currently free of invasive species, but if project activities introduce invasive species into the area, that could have a negative indirect effect on the occurrence by causing a loss of individuals. This impact would be mitigated by the invasive species treatment program currently in place on the MNF, where removing invasive species from special status plant species occurrences is a high priority.

Anisocarpus scabridus is also known from three other occurrences on the MNF outside the Plaskett-Keller project area, which cumulatively contain several hundred individuals. Therefore, even if the proposed action negatively affects individuals within the occurrence in the project area, it is not likely to cause the species to trend toward federal listing.

Special Botanical Habitats

Keller Lake is a small wetland habitat on the southwestern flank of Black Butte that is located downhill of project unit 251. It is therefore within the project area but not within a salvage or roadside hazard unit. It is comprised of a sphagnum peatland as well as an area of open water. This lake does not appear to be hydrologically connected to the surrounding area via an inflow or outflow, though there may be subsurface connections. This type of wetland habitat is very uncommon on the Mendocino National Forest, and hosts a variety of unusual plant species, although no special status plant species were detected during a site visit in September 2021. The boundary of the nearest project unit is over 700 feet away from the lake, so this habitat should not be directly impacted by project activities.

Plaskett Meadows is a series of high-elevation wet meadows near Plaskett Meadows Campground and project units 310, 29, and 32. Within this meadow system is the two Plaskett Lakes, which are naturally occurring but the outflows have been artificially raised to retain water longer in the season. Plaskett Meadows are a botanically rich area with many uncommon native plant species, though no threatened, endangered, or sensitive species have been documented in previous surveys.

Invasive Species Risk Assessment- The equipment used to implement this project will be frequently entering and/or passing through roadside infestations of non-native invasive species. This equipment is likely to expand existing infestations and spread seeds to other portions of the project area. The existence of many weed propagules already within the project area combined with the extensive ground disturbance caused by this project indicates a high risk of expansion and/or spread of existing sites. This is evidenced in part by the existence of three heavily infested landings from prior projects: one within unit 26, and two just south of unit 270 along Forest Service Rd 22N11. If any of these landings are re-used, which is likely, project activities will almost certainly spread invasive species further. The overall invasive species risk for the proposed action is therefore **high**. Following the Standard Mitigations to Reduce Invasive Species Introduction and Transfer (Appendix B) will help reduce the spread of invasive plants.

No Action

Under the no action alternative, no project-related ground disturbing activities will take place. This alternative would therefore have no direct or indirect effects on Forest Service Sensitive or Survey and Manage plant species.

There are no previously known occurrences of federally Threatened, Endangered, or Proposed plant species within the project area. Thus, the four species listed above (water howellia, Burke's goldfields, Contra Costa goldfields, and showy Indian clover) will not be affected by the Proposed Action and no action alternative.

Invasive Species Risk Assessment- Under the no action alternative, no ground disturbing activities will take place. The risk of spread and introduction of invasive species due directly to the equipment use and ground disturbance of the proposed action would be eliminated. However, because most infestations occur along roads, regular vehicle use of roads represents an existing low background risk. The overall invasive species risk for the no action alternative is therefore **low**.

Modified Proposed Action

The modified proposed action (Alternative 3) would occur within the same units delineated in Alternative 1, but some of the probabilities used for marking trees would be more conservative (i.e., more fire-damaged trees would remain in this alternative). Although fewer overall trees would be removed in Alternative 3, there would still be ground disturbance and equipment use in the same project unit footprints, so the impacts to botanical resources would be essentially the same. Therefore Alternative 3 was analyzed with Alternative 1 for the effects analysis.

4.3. Fuels

The Plaskett-Keller Project encompasses a variety of vegetation and fuel types. Fuel models exist from grasses and shrubs to various timber types (see Silviculture Section and Report).

Within the project area, fire has departed from the historical fire frequency that was present prior to the fire suppression era. This departure has also led to ground fuel accumulations, decadent brush with less diversity and stands that are overly dense with ladder fuel components. These conditions created high hazardous fuel loads which resulted in high mortality within the project area. The past high-density green forest stands are now predominantly high-density dead tree stands.

Up until 2020 August Complex, fire history in the project area was minimal. Seven fires burned within the project area from 1980 to 2020. Prior to the 2020 August Complex, recorded fires were all under 250 acres in size due to fire suppression activities. The 215-acre Baseball fire, in February 2020, was the last notable fire prior to the August Complex. Just south of the Plaskett-Keller Project, the Hunter Fire and several other fires burned larger areas within the forest in the past.

Significant reduction to near total elimination of surface and small understory (ladder) fuels is a persistent characteristic of the areas that burned with moderate and high severity effects within the Project Area. The August Complex reduced mean surface fuel loads by over 60 percent, even in low severity burn areas. This change in fuel loading and composition is expected to reduce wildfire intensities and rates of spread for several years. However, high snag densities and a complex arrangement of fallen trees, broken tops and branches intermixed and suspended within an increasingly heavy shrub component will eventually create hazardous fuels conditions that would increase the likelihood of future high severity wildfire, and limit the ability of firefighters to safely and effectively control future wildfires. A recent study concluded that, while factors like fire weather and topography are important drivers of fire severity patterns, woody fuels and vegetation structure can also influence fire severity in reburn fires. They found that in areas that initially burned at high severity, high density of snags and down woody fuels were subsequently associated with high severity effects in the second fire. Shrub cover was also generally associated with higher severity reburn (Coppoletta et al 2020).

4.3.1. Environmental Consequences

Proposed Action

The Proposed Action has the ability to reduce future fuel loads to manageable levels; reducing fuel loads ultimately reduces fire behavior. Fuel load projections through Forest Vegetation Simulator (FVS) in Table 4Table 4. Fuel loading projections for selected units with research plots. for the Proposed Action show levels of 1.75 to 9.02 tons per acre for the proposed action. By reducing future surface fuel loads, the Plaskett-Keller project area will be more resilient to wildfire and more easily managed with prescribed fire after the Proposed Action is implemented.

Table 4. Fuel loading projections for selected units with research plots.

	Average of all plots taken in Unit PK_26							Average of all plots taken in Unit PK_26					
	Projections of Surface Fuel Loading in Tons/Acre (10 Year Cycles)							Percent Surface Fuel Load Reduced (10 Year Cycles)					
Alt.	2021	2031	2041	2051	2061	2071		2021	2031	2041	2051	2061	2071
Proposed Action	1.82	2.88	3.37	3.07	2.50	2.05		58%	92%	94%	95%	96%	96%
No Action	3.15	35.02	57.16	62.43	62.71	57.67		0%	0%	0%	0%	0%	0%

	Average of all plots taken in Unit PK_271							Average of all plots taken in Unit PK_271					
	Projections of Surface Fuel Loading in Tons/Acre (10 Year Cycles)							Percent Surface Fuel Load Reduced (10 Year Cycles)					
Alt.	2021	2031	2041	2051	2061	2071		2021	2031	2041	2051	2061	2071
Proposed Action	3.59	6.74	8.16	7.35	6.02	4.94		46%	86%	90%	91%	93%	94%
No Action	7.85	48.76	79.20	82.00	80.36	77.52		0%	0%	0%	0%	0%	0%

	Average of all plots take in Unit PK_272							Average of all plots take in Unit PK_272					
	Projections of Surface Fuel Loading in Tons/Acre (10 Year Cycles)							Percent Surface Fuel Load Reduced (10 Year Cycles)					
Alt.	2021	2031	2041	2051	2061	2071		2021	2031	2041	2051	2061	2071
Proposed Action	1.75	6.55	9.02	8.44	6.90	5.66		101%	86%	88%	90%	91%	92%
No Action	1.73	46.18	76.29	82.59	80.50	73.99		0%	0%	0%	0%	0%	0%

As demonstrated in the aftermath of the 2018 Ranch Fire, tree mortality (including fire-caused as well as ongoing beetle-kill) continues to exceed Forest capacity to manage downed and hazardous trees and has caused closures of roads, trails and facilities. Forest management staff are also observing an increasing accumulation of surface fuels. After the Ranch Fire, the Forest sold several roadside hazard tree reduction projects. However, several of the hazard tree areas ended up not being salvaged or implemented resulting in remaining safety concerns and a lack of funds to do post-fire fuels treatments. The Forest now has to secure funds to do thinning and piling work through service contracts, which costs thousands of dollars per acre, in the current market. Additionally, Forest employees would still need to cover the piles for winter and then burn them. If trees are not removed with this project, and if the cost is similar to the current market, we can expect to spend several thousands of dollars per acre just treating fuels in these salvage units (based on most recent contract bids). The Plaskett-Keller project area is remote and burning fuels piles will take additional time.

Salvage logging in moderate and high fire severity areas would generate an increase in surface fuel if materials, such as limbs and treetops, are not removed from the site to a landing. In treatment units that undergo whole tree yarding, an increase in surface fuels would not result in a significant elevation of fire risk of severity potential. Where cut material less than 12 inches in diameter remains in the treatment unit, the increase in surface fuels would increase fire risk and potential severity above pre-treatment levels. Within the short-term (0-5 years) this would not cause a significant increase in fire risk at the landscape level because treatment units would be relatively isolated within a larger matrix of burn areas with very little surface fuel. However, within 5 to 10 years as many of the fire killed trees begin to fall and brush species become established across the landscape, the fire risk and potential severity would increase significantly. Large amounts of downed trees and limbs would reduce the effectiveness and efficiency of fire control efforts and create a continuous fuel bed of heavy surface fuels beneath thick brush and regenerating conifers. Mechanical piling of these fuels within the treatment unit followed by burning would mitigate this increase in strategic locations across the landscape, providing fire managers with more options to safely respond to future wildfires that will occur within the untreated portions of the August Complex Fire area.

Fuel accumulation would be reduced to no more than 10 tons/acre by removing merchantable timber and biomass and by burning slash piles.

Cumulative Effects

The Smokey Project was being implemented before the August Complex burned. This project**,** combined with the Plaskett-Keller Project, may have a cumulative reduction on the potential size of fires that are large enough to contact more than one treatment. These projects combined can be expected to have a cumulative reduction on the potential size of fires that are large enough to contact more than one treatment (Finney 2001). However, what remains intact of the Smokey project after the fire are small units and is unlikely to have a great impact on future large fires without significant additional fuels treatments in addition to the Plaskett-Keller project being analyzed here. The Baseball Project also lies within the Plaskett-Keller project area. Most of the Baseball units burned at very high severity with complete or near complete mortality. However, two of the Baseball units burned with mixed severity and remain largely intact. These two areas are also likely to have some cumulative reduction in size and intensity of future wildfires where Plaskett-Keller units are near or adjacent to them.

Due to the widespread, but short-lived, impacts of emissions from fire, no other projects were considered for this cumulative smoke/emissions impact analysis. Emitted pollutants from fire do have an effect on an area, the size of which depends on atmospheric conditions at the time of the fire. Within

this area, pollutants from fires can be cumulative with emissions from many sources, including other fires, vehicles, industrial sources, buildings and agriculture. It is impossible to predict what pollution sources may be present at the time of a fire occurring at some unspecified date in the future.

No Action

Under this alternative, no treatments would occur. Initially, lack of fuels in the burned area generally would not support large high intensity wildfires. As fire-killed vegetation falls over into a growing volume of live vegetation, wildfires may be expected to grow in intensity, size, and suppression difficulty. Thus, the trend of increasing high severity wildfire, with associated ecosystem impacts, will not change (Miller et al. 2008). Table 4 shows a significant increase in surface fuel load contributions from dead trees if they are not removed (1.72 to 82.59 tons/ac).

Reburn effects in dense post-fire stands are not just problematic from a fire suppression standpoint but also from one of fire effects. Heavy fuel loading in a reburn often leads to long residency time of heat on the soils, heating not only the soil but killing any natural revegetation.

Reburn effects in recent high intensity wildfires have been noted also to take out green stands that were left during previous fires. Such an example can be seen in areas of the Ranch Fire where the Forks Fire in 1996 and the Back Fire in 2008 re-burned. Figure 13 shows a 100-acre Late Successional Reserve (LSR) forest stand before and after (re-burn) in the 2018 Ranch Fire. The fuel loading at the time of the post Forks Fire image was around 35 tons/acre. The photo and tons/acre data were collected doing Browns transects during project planning in 2010. Modeling post Ranch Fire in the same 100-acre stand indicates that by the year 2029 we may expect to see 75 to 130 tons/acre fuel loading from falling snags alone and, by the year 2049, 138 to 232 tons/acre of fallen snags. The Forks Fire had left green stands that were subsequently completely burned up during the Ranch Fire with much less fuel loading than what is predicted to come out of many areas post Ranch and August Complex Fires.

Figure 13. Photos of post-Fork/pre-Ranch and post Ranch Fire.
Notice that all live vegetation post Fork fire was consumed during Ranch Fire.

The Mendocino National Forest strives to utilize a confine and contain strategy for suppressing wildfire utilizing natural features and areas of low fuel loading as containment features when appropriate. This allows for low and moderate severity wildfires to accomplish resource objectives within an identified area; however, successful implementation of this strategy relies upon the presence of strategic containment options across the landscape. Under this alternative, options for containment of naturally ignited wildfires would be few, decreasing the likelihood that wildfires would be allowed to accomplish resource objectives; full suppression of all wildfires would be the likely response. As wildfire intensities or a high volume of standing dead trees preclude direct suppression with ground forces, indirect tactics, heavy equipment, and aircraft would be more heavily utilized. Ultimately, future fire size, and suppression and emergency rehabilitation costs would increase under the No Action Alternative.

Without treatment, dead standing and fallen snags hinder suppression efforts by posing an unacceptable risk to firefighters. These snags ignite easily, block existing roads and trails, and complicate fire control measures by reducing fuel break construction rate and compromising fire control lines. Standing dead trees, burning or not, may fall at any time in any direction without warning. The landscape will be at a great risker of wildfires that would be difficult to control due to the high levels of standing and fallen snags and a complex arrangement of fuels. An example of this was seen during the 2020 August complex when several Type 1 crews refused to engage within Hellhole Canyon because of the conditions created from the 2004 North Pass Fire. The heavy accumulation of downed large trees and shrubs made it too hazardous. This section of the control line remained uncontained for several weeks.

Modified Proposed Action

Under the modified proposed action, if trees with a 10% chance of survival die, then fuel loading would be expected to be higher than Alternative 1. Since fuel modeling in FVS was conducted only on dead trees at the time of plot set-up, the modeled fuel loading numbers would not change. (Modeled fuel loading did not account for the trees that might die under Pm70 or Pm90.) In both alternatives 1 and 3, modeled fuel loading remains the same (Table 4).

4.4. Geology

The Plaskett-Keller Phase 1 project area is underlaid by Franciscan Assemblage bedrock. This bedrock is primarily greywacke sandstones, fine-grained metasediments, distinctively green metamorphosed basalt, and quartz-mica schist. There are some noticeable outcroppings of metamorphosed basalt (commonly known as greenstone), often towering as rockfall sources above areas of talus. Black Butte Mountain is a prominent rockfall source resulting in large talus fields around and below Keller Lake. The project is next to but not within the Black Butte Wild & Scenic River corridor. Geologic resources in the project area include groundwater, rare talus and crevice caves (de la Fuente and Mikulovsky 2017), and landslide-prone dry glades. Natural landslides are an important part of the project area's environment. Talus and crevice caves are not known to be inside proposed activity units.

Figure 14. There are extensive rockfall and talus areas on the western flank of the Black Butte. These areas can have caves. This very old rockfall area was excluded from unit 21. Photo taken by Ryan Mikulovsky on 4/21/2021.

Natural landslides are an important and necessary part of the area's environment. Active landslides and inner gorges are Riparian Reserves under the Northwest Forest Plan and MNF LRMP. Landslides, including debris flows, deliver coarse and large woody debris along with extremely large boulders to very fine sediment sizes to streams (Spies et al. 2018). These inputs are critical buildings blocks of resilient stream networks and fish habitat (de la Fuente and Mikulovsky 2017). In addition, landslides can have micro-climates with their varied terrain ranging from steep scarps to gentle benches that sometimes include closed basins or sag ponds such as Keller Lake. New landslides cause ecosystem turn-over, reverting lands to early seral, thus increasing ecosystem heterogeneity and diversity. All these processes are true in the Plaskett-Keller Phase 1 project area with its widespread active and dormant landslides (de la Fuente and Mikulovsky 2017). In fact, the entire western flank of Black Butte Mountain is a very large landslide complex that is mostly dormant with small active slides in stream channels.

Where salvage units are located, there is no strong evidence of slide movement, so they are on the dormant part of landslide complexes.

There are many active slides within the project area. Preliminary and unpublished Interferometric Synthetic Aperture Radar (InSAR) mapping showed just one area that may be moving in the project area (Xu et al. 2020). That area is outside of activity units. In salvage units, there are no known unstable area riparian reserves such as active landslides and inner gorges. Roadside hazard units intersect with about 15 acres of known or suspected active landslides, most of which are near or in stream channels. Roadside units also intersect with about 8 acres of inner gorge. Some of these are coincident with active landslides. Inner gorges are steep streamside banks with slopes greater than 65%.

Landscape-scale mortality caused by the August Complex can lead to dramatic reductions in evapotranspiration and loss of soil support by roots. Compared to a non-burned environment, this means groundwater will be elevated in the upper few meters of soil and bedrock. It is therefore likely soil pore pressures will be higher after the wet season for longer than normal. In addition, tree roots of dead trees are expected to rapidly deteriorate, which can progressively weaken soil and cause more shallow landslides and rockfall on 65% and higher slopes. Finally, fire altered soils and lack of canopy cover can also increase the risk of bulking debris flows because of increased runoff, particularly during the first wet season after a major fire (Cannon and Gartner 2005). All these factors plus the area's relatively unstable area geology (de la Fuente and Mikulovsky 2017) mean that deep-seated and shallow landslide frequency and rates will be naturally elevated for decades or until lands are sufficiently revegetated with deep rooted trees with at least pre-fire evapotranspiration rates to reduce soil pore pressures. Based on the Forest Geologist's observations of past burned areas, most new landslides are expected to occur along streams.

Post-fire suppression repair and other road repairs and maintenance help to reduce the risk of road-related debris flows and landslides. For example, post-August Complex BAER implementation included armoring of fill slopes, road reconditioning (such as cleaning ditches and grading road for drainage) and repairing or maintaining drainage structures (such as cleaning out culverts) on the 22N11 road and a few other roads in the project area. As of June 8, 2021, there has been no identified *mass wasting* affecting roads in the project area. This may be a result of suppression repair, BAER implementation and/or a very dry winter. To date, spring and summer convective storms have not caused known mass wasting in the project area.

4.4.1. Environmental Consequences

Proposed Action

Alternative 1, the Proposed Action, includes salvage, roadside hazard tree removal, and fuels treatments. Avoiding the use of mechanical equipment on landslides is the single-most important way to prevent management-related failures (Chatwin et al. 1994). Salvage units were thus planned to avoid known and suspected unstable areas. Units are mostly on gentle ridge tops where slides in the area are rare. It is possible that new landslides may occur in salvage units at any time, although this is not expected for the rest of the 2021 dry season. As of June 2021, no salvage units include known or suspected unstable areas including active landslides and inner gorges. Roadside hazard tree abatement units do include about 15 acres of known or suspected active landslides and about 9 acres of inner gorge – some of which are coincident with active landslides. With application of geologic design features along with design features from soils and hydrology, these areas will have negligible impacts.

In salvage units 5, 16, 20, 21, 26, 251, and 272, trees must be 100% dead to be harvested. That includes the steepest units 16, 20, and 251. Trees next to high-use roads such as Forest Highway 7, the Snow

Basin Recreation area, and in high dispersed use areas would be marked for salvage if they are at 70% or higher probability of mortality. These units include 13, 29, 33, 270, 271, and 310. In Plaskett Campground's unit 311, trees may be marked for harvest at 50% or higher probability of mortality. Unit 311 is on very gentle ground with no signs of instability, on mostly 20-30% slopes.

As trees die, trees have greatly reduced to no evapotranspiration. If trees are 100% dead, they do not evapotranspire and so remove no water from the ground. Therefore, on the landscape scale, comparatively little water is being withdrawn from the ground and that can increase pore pressures. The roots of these dead and dying trees will decay within 2-3 years. Dead trees eventually lose all needles, reducing canopy cover and decreasing canopy interception of rain. Thus, the main ways trees can stabilize slopes are diminished to non-existing. What is left over is the physical ground-based activity of salvage. Impacts of salvage could come from ground-based equipment ground disturbances. Mainly, in machinery disturbed areas, there can be reduction in infiltration and rerouting of surface water flow paths (Swanston and Swanson 1976). This would slightly indirectly elevate the risk of mass wasting if concentrated runoff is delivered onto steep or unstable slopes. However, project activities are limited in scale compared to the entire watershed and they mostly avoid slopes greater than 35%. About 241 acres out of 944 acres are slopes above 35%, and they are usually next to gentler intervening topographical benches or existing roads. Steep slopes above 65% are rare in ground-based units, just 9 acres out of 944. It is unlikely that equipment will operate on those slopes. Finally, geologic, soil and hydrologic design features and best management practices restrict equipment from steep and unstable slopes and require best practices (such as groundcover requirements) that help to reduce equipment impact on slopes and soils.

In some units, trees can be marked if they have 50% or 70% or higher probability of mortality. It is then possible that some fire damaged trees with a chance of survival will be salvaged. Given the landscape-scale tree mortality of the August Complex (see basal area loss in Figure 7), removal of some trees that may survive will have negligible impact on overall groundwater and stability. New slides are most likely to occur in steep drainages and at roadcuts, not midslope in salvage units.

With successful application of geology design features, such as prohibition of ground-based equipment in unstable areas, there should be negligible indirect, direct, and cumulative effects from salvage activities. Soil and hydrology best management practices or design features also help to protect slope stability and unstable areas. Activities in salvage units are limited in scale and mostly restricted to slopes less than 35% in areas with no unstable areas. Existing logging infrastructure in salvage units are stable with no signs of related mass wasting. Therefore, no project cumulative effects are expected for slope stability and existing unstable areas.

There should also be negligible negative indirect and direct effects from hazard tree abatement and fuels activities. These activities are much less intensive than salvage, but they require the same geologic design features such as no equipment in unstable areas. Project activities are limited in scale compared to the overall watershed. Hazard tree abatement of trees within striking distance of the road (usually 1.5 times tree height) would be removed, limiting ground disturbance and skidding. Hazard tree abatement activities are also largely restricted to gentle slopes in areas with few active landslides. Most active landslides within HTA units are in inner gorges, where equipment is prohibited. Past hazard tree abatement activities in the Ranch Fire have so far not resulted in any observed management-related landslides. These project activities would help reduce fuels, greatly increase safety, increase likelihood of reliable access to the area, and possibly help to reduce the risk of future large high-intensity wildfires in the project area. As discussed in the Affected Environment, landscape-scale high intensity wildfires increase the risk of mass wasting.

There are possible benefits of salvage logging trees and hazard tree abatement in that removal of dead trees can reduce uprooting. Uprooting greatly disturbs localized areas of soil and their holes can concentrate water, which may lead to mass wasting on steeper slopes. Uprooting is common in dead tree stands as dead tree roots rot away and trees topple, potentially making slopes unstable (Chatwin et al. 1994). Salvage would also help to reduce long-term fuels loading and increase safety of USFS staff and the public in a popular recreation area. Salvage and hazard tree abatement activities will accelerate mulching of slopes with fine to coarse organic material. Mulch or groundcover can help reduce erosion and mass wasting. In addition, salvage is a type of site preparation that would be very helpful for more successful reforestation in future restoration projects.

Forestry-related research activities would have no deleterious effects on geologic resources and hazards. These are subunits to the main salvage units, and some subunits may receive no or less salvage activities. This research may improve our knowledge of best practice restoration activities in burn areas.

None of the proposed activities would impact caves, fossils, and mineral access. There are no known fossil localities or mineral activities in the project area. Caves are not known to be within project ground disturbing units. The Black Butte Wild and Scenic River Corridor and its watershed's geologic resources, hazards and Wild & Scenic River Outstandingly Remarkable Values would be negligibly impacted.

No Action

Alternative Two, the No Action Alternative, means that existing environmental trends would assuredly continue in areas that the Proposed Action would have treated. Dead and dying trees would not be removed unless they prove an immediate hazard to humans or are already fallen onto the road. Hazard trees would be felled and bucked off roads. Down trees and hazard trees will continue to be a long-term hazard and fuels concern. They would regularly impede access to the project area. Slopes will not be disturbed by heavy machinery and so surface flow-paths would not be altered.

Modified Proposed Action

For **Alternative Three**, the Modified Proposed Action, the effects would be the same as those under the Proposed Action as units and activities are the same, though with slightly less intensive salvage for units in high use areas. Mechanical disturbance would likely be similar to alternative one despite salvage of less trees in units with 90% probability of mortality. Windthrow may be more common with more remaining weakened or dying trees. However, units with the modified PM are on gentle ground where uprooting trees would not impact slope stability.

4.5. Heritage

The survey strategy for this project employs intensive survey techniques ranging from 15 to 30 meter transect intervals. This intensive level archaeological survey is adequate to locate any heritage resource sites. The archaeological surveys covered for this project have been completed by Mendocino National Forest Archaeological staff during the summer of 2021. The surveys within project units and roadside hazard treatment areas were completed to meet the requirements of both the Region 5 Programmatic Agreement (2018 RPA), and, where applicable, Appendix H of said Programmatic Agreement, the Region 5 Hazardous Fuels Protocol for Non-Intensive Inventory Strategies for Hazardous Fuels and Vegetation Reduction Projects. This direction allows for the use of a non-intensive survey strategy to be used on slopes greater than 30%. Intensive-level surveys were applied to the entirety of the proposed salvage and roadside units that had not been previously surveyed at the intensive level, or were not on slopes in excess of 35%. Thirty-four (34) previously known sites were visited and rerecorded for records update while two new sites were found and recorded. Any new sites discovered during implementation will be protected accordingly (documented, flagged and avoided) to the standards of the 2018 RPA. The Black Butte Wild and Scenic River Corridor and its Heritage resources will not be impacted.

4.6. Hydrology

The project is located almost entirely within the Black Butte River watershed of the Eel River basin, some 15,060 acres. The Planning area is in Black Butte watershed drainages, which include the Blue Slides, Atchison, Butte and Cold Creeks Hydrologic Unit Code (HUC) 14 sized (approximately 8,000 to12,000 acres) watersheds (Figure 15). The remaining approximately 90 acres are within the Grindstone Creek watershed of the Sacramento River basin and include the Panther and Harvey Springs, also HUC 14 sized watersheds.

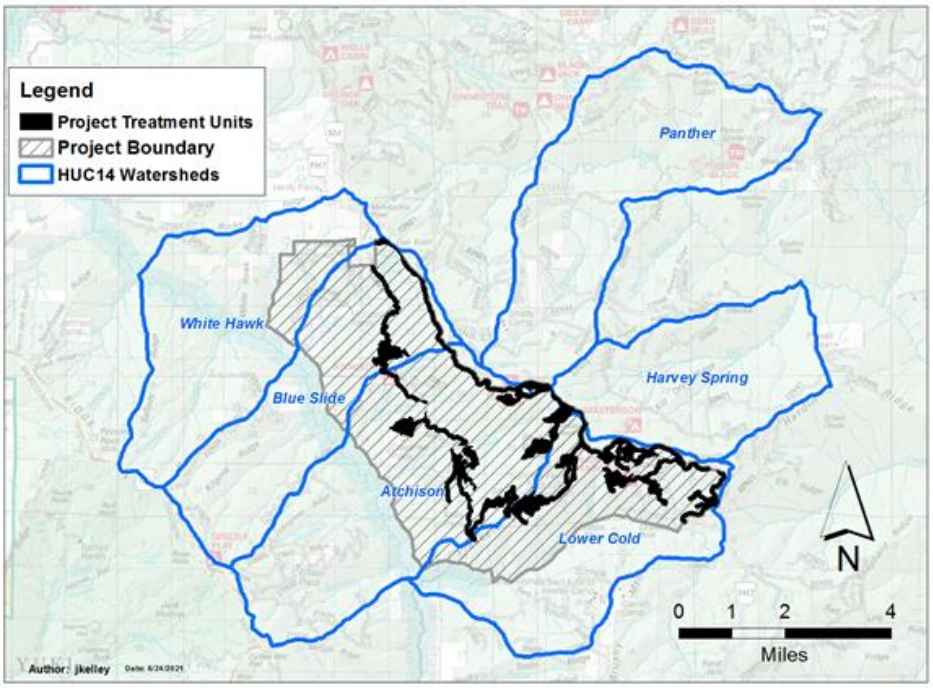


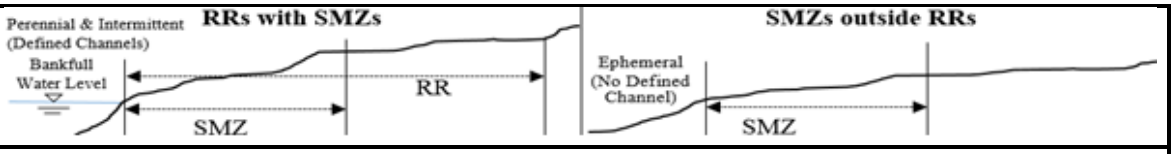
Figure 15. Proposed project and treatment areas with HUC 14 watersheds.

The majority of streams within the project area are smaller low order streams, orders 1 to 3 ephemeral and intermittent drainages, with some larger order 4 and 5 perennial drainages. Ephemeral and intermittent drainages often have gradients of 15% or higher with side slopes of many drainages, including perennials, greater than 45%. Some inner gorges are present with slopes over 65%. In the proposed salvage units, the stream sides slopes are mostly 35% slope or lower. Table 6 shows that riparian areas burned with less severity than the majority of the corresponding watersheds.

These streams tend to have over-steepened and unstable side slopes, with numerous active slides in midslopes to lower slopes with high sediment loads. The main drainages of the project area; Blue Slides, Atchison, Butte and Cold Creeks are tributaries to Black Butte River and contribute to elevated sediment levels due to natural instabilities. Black Butte River supports Steelhead below these tributaries.

The project boundary encompasses about 4,510 acres of Riparian Reserves (RRs) with approximately a third or about 1,600 acres of Streamside Management Zones (SMZs). SMZs are based on a 50- foot-wide buffer per side. In the proposed salvage units, there are about 95 acres of RRs and 68 acres of SMZs planned. See Table 5. RRs and SMZs constitute a hierarchy of areas designated to protect water quality, aquatic and riparian habitats (Figure 16). The highest level of protection occurs within the SMZ, where no ground-based mechanized equipment is allowed to operate except at designated crossings. Further,

no landings or tractor piling are permitted within RRs or SMZs. Sale Area Maps or Project Maps will be used to ensure recognition and protection of areas related to water quality protection. SMZs will have no cutting of any true riparian vegetation or any vegetation contributing to stream bank stability. No treatment of riparian vegetation will occur within the mapped wetlands, located in RRs. Thus, the Proposed Action will have no potentially significant impacts to wetlands. RRs and SMZs will be flagged prior to implementation for protection. Additionally, preference for snag and large down wood retention identified in wildlife guidelines/BMPs have been given to snags located in RRs, within SMZs, as well as snags providing structural support to stream banks.



RR and SMZ width for each stream class: (All distances are by Slope)			
Stream	Riparian Reserve Buffer	SMZ in RR	SMZ outside RR
Perennial w/Fish	600 feet (300 ft/side)	50 ft/side or to the slope break if greater	N/A
Perennial	300 feet (150 ft/side)	50 ft/side or to the slope break if greater	N/A
Intermittent	200 feet (100 ft/side)	50 ft/side or to the slope break if greater	N/A
Springs	100 feet	50 ft/side or to the slope break if greater	N/A
Wetlands	100 ft (<1ac) 150 ft (>1ac)	50 ft/side or to the slope break if greater	N/A
Ephemeral	N/A	50 feet	50 feet

Figure 16. Definition for Riparian Reserves and Streamside Management Zones (Distances are in feet per side of feature)

Table 5. Approximate Acres of RRs and SMZs within Project Treatments

Buffer Type within Treatments	**Water Feature**	**Treatments (acres)**			**Total Salvage & Fuels (2,164 ac)**
		Salvage Units (944 ac)	**Roadside Salvage Units (229 ac)**	**Roadside Fuels (991 ac)**	
RRs (includes SMZs)	Perennial	5 ac	13 ac	47 ac	278 ac
	Pond	6 ac	0 ac	2 ac	
	Intermittent, Wetlands & Springs	42 ac	28 ac	134 ac	
	Active Slides (overlaps some acres above)	0 ac	1 ac	0 ac	
	Totals	53 ac	42 ac	183ac	
SMZs	Perennial, Intermittent, Ephemerals, Ponds, Wetlands, Springs & Active Slides	39 ac	29 ac	119ac	187 ac

The North West Forest Plan defines RRs as a generic distance from stream courses (USDA, 1995). It does not differentiate functioning riparian habitat from adjacent upland habitat. From a fisheries perspective, riparian habitat of importance consists of hydrophilic (water-loving) plant species and upland plant species that are providing direct bank stabilization and/or direct shade to the stream. Further, the US Fish and Wildlife Service National Wetlands Inventory shows only 2.7 acres of riverine and freshwater emergent wetlands within the proposed project units RRs (USF&W NWI, 2021). Given this, there are less than 3 acres of direct or hydrophilic riparian habitat within the proposed project. This type riparian habitat within reserves is wholly contained within the width of the SMZ. Heavy equipment is not allowed to enter into this habitat (50-ft SMZ buffer). Most of the RRs in this proposed project are upper watershed drainages, that have a large terrestrial habitat component. The main contributions of the of terrestrial portion of the RR is large woody debris.

Soil Burn Severity

The August Complex Fire burned severely in some areas. Within all the HUC 14 watersheds that include the Proposed Project Area, 15% of the area burned at high Soil Burn Severity (SBS). The majority burned at a moderate to low severity SBS and the effects to the burned watersheds were not catastrophic given a relatively small percentage of each watershed that was burned at high severities, particularly at the scale of the full Black Butte Basin. At the HUC 14 watershed scale, a higher percentage burned at moderate SBS ratings (Table 6). Further, stream side areas (i.e., Riparian Reserves) had fewer high SBS areas than the uplands. Nevertheless, those watersheds with higher burn severities, will take slightly longer to recover hydrologically. Elevated erosion and sedimentation are expected for several years but negative effects should be ameliorated in time and space as this sediment makes its way downstream. Further, lower burn severities in riparian areas should aid in sediment retention.

SBS indicates effects of fire on soil. Fire damages soil structure by heat and reduces infiltration by consuming ground cover. Because low SBS ratings have little change in runoff, only Moderate and High were used. Moderate: Soil structure is not altered; decreased infiltration due to duff and understory twig consumption creates runoff. Brown needles remain on trees, creating mulch when dropped. High: Duff is completely consumed. Soil structure is destroyed; hydrophobicity causes high runoff, with soil loss and ash movement. Tree trunks are consumed with no needles remaining (USDA RMRS 2010). SBS data is from the August Complex Report (USDA BAER 2020).

Table 6. Soil Burn Severity (SBS) within the Project Area by 14th HUCs (Full Watersheds versus Terrestrial & Riparian Reserves)

14th HUC WSHD	Full Watershed					Terrestrial Acres (estimated acres outside of RRs)					Riparian Reserves (estimated acres)				
	WSHD Acres	% SBS				Terrestrial Ac by WSHD	% SBS				RRs Ac by WSHD	% SBS			
		% High	% Mod	% Low	% Unburned / Very Low		% High	% Mod	% Low	% Unburned / Very Low		% High	% Mod	% Low	% Unburned / Very Low
Atchison	11,568	19%	71 %	9%	1%	10,128	20%	72%	7%	1%	1,441	14%	65%	20%	1%
Blue Slide	7,809	19%	57 %	23%	1%	6,797	21%	57%	21%	1%	1,012	8%	59%	33%	1%
Lower Cold	8,858	15%	53 %	28%	5%	7,644	16%	54%	25%	5%	1,214	6%	47%	45%	3%
White Hawk	8,447	7%	66 %	26%	1%	7,328	8%	68%	24%	>1%	1,118	3%	49%	44%	4%
Ave Percentage		**15%**	**62 %**	**21%**	**2%**		**16%**	**63%**	**19%**	**2%**		**8%**	**55%**	**35%**	**2%**
Multiplication Comparison of RRs vs Terrestrial (Ave Percentage)												**0.5**	**0.9**	**1.8**	**1.0**

Note: the Grindstone HUC 14 watersheds are not listed due to the limited project area within those watersheds.

Field Observations

Various types of field observations and surveys were conducted to form a baseline understanding of watershed conditions within the project area.

Channel Stability Evaluations (Pfankuch Surveys)

Stream channel stability evaluations (Pfankuch 1975) have been evaluated in the Project area dating back to 1976, and updated in 2021. These surveys evaluate the resistive capacity of mountain stream channels to the detachment of bed and bank materials, and provide information about the capacity of streams to adjust and recover from potential changes in flow and/or increase in sediment production. Additional details on these evaluations can be found in the Hydrology report.

Table 7. Evaluations Pfankuch for Stability Rating by HUC 14 Watershed

HUC 14 Watershed	Ave Pfankuch for Stability Rating	TOC Coefficient
Blue Slides	Low Good	0.12
White Hawk	High Fair	0.12
Atchison	Med Fair	0.11
Lower Cold	Med Fair	0.11
Harvey Spring	High Poor	0.10
Panther	High Poor	0.10

Stream Condition Inventory (SCI)

Stream Condition Inventory (SCI) plots monitor stream features, or attributes, that are useful in classifying channels, evaluating the condition of stream morphology and aquatic habitat, and making inferences about water quality (Frazier et al. 2005). SCI in-channel monitoring was done in a tributary to Butte Creek in 2017 and 2019 in a pre-fire environment with a post fire SCI update in 2021. Additional details on these surveys and protocol can be found in the Hydrology Report.

The August Complex of 2020 showed a substantial shift in changes to the physical attribute to the Butte Creek tributary between 2019 and 2021. The monitoring reach appears to be steepening. Deposition is also happening within all features, especially in pools. Deposition could partially explain the increases in slow-water features and decrease in fast-water features.

Figure 17. Tributary to Butte Creek, Stream Condition Inventory (SCI) site. Comparison between pre (left) and post (right) August Complex

This tributary was reclassified in 2021 to a Rosgen C4 stream type, characterized by the presence of point bars and other depositional features. The channel type is very susceptible to shifts in both lateral and vertical stability caused by direct channel disturbance and changes in flow and sediment regimes of the contributing watershed. (Rosgen 1996). These changes are not unexpected in a postfire condition. Noticeable changes include the loss of shade and increase in water temperatures. Loss of streamside and riparian vegetation has created instability for the streambanks. Streambanks will likely remain unstable until the stream has reached equilibrium and/or vegetation has recovered. Increased fine sediment deposition has caused an increase in width/depth ratios and the potential for greater sinuosity. However, the SCI survey has shown some increase in large woody debris (LWD) after the fire. This can lead to some stream stability and sediment stabilization. Further, it is anticipated that LWD recruitment will continue as dead and dying trees fall into streams. Subsequent monitoring will be needed to track the changes. These types of streams are considered relatively stable and are not a high sediment supply stream channel. They are also moderate in their sensitivity to disturbance and have excellent recovery potential (Rosgen 2006).

Road Surveys - Hydrologic Connectivity

The purpose of the hydrologic connectivity analysis is to determine what percent of the road network is directly connected to the stream system and delivering sediment without the filtering effect of a buffer strip. A reduction in percent hydrologic connectivity represents decreased sediment contribution from the roads and a return to a more “natural” drainage system. Road segments that are disconnected from the stream system return surface flow to subsurface flow by dispersing it onto a buffer strip where it can percolate back into the ground.

Surveys for road hydrologic connectivity were performed within boundaries of the Project Area in 2021; most road segments were surveyed (51.3 out of 55.7 miles). Overall road connectivity within the Project Area is about 20%, which is favorable. Hydrologic connectivity for older, unimproved forest and ranch road systems has typically averaged from 30% to 55% over large watershed and river basin areas (Weaver et al. 2015) For more information on these surveys, see the Hydrology Report.

The Project Area's road density (which includes all maintenance level roads) is 19.3 ft of road per acre (or 1.47 km/km^2), which is considered low. Increased peak flows in streams may be evident at road densities of 27 to 40 ft of road per acre (2–3 km/km^2) (Kastridis, 2020).

4.6.1. Environmental Consequences

Proposed Action

Direct, indirect, and cumulative effects of the action and no action alternatives are fairly similar. It is assumed that these effects would be short term.

Direct and indirect effects associated with treatment include temporary effects due to removal of timber with ground equipment, fuel treatment, creation of temporary roads, and burning. Use of heavy equipment may affect soil compaction. Mitigation of leaving 70% ground cover can lower surface runoff and compaction, particularly in areas of high SBS ratings. Further, prohibiting ground-based mechanical equipment entry into SMZs and limiting ground disturbance within Riparian Reserves can limit negative soil effects.

The proposed action has the potential to temporarily affect hydrologic/riparian resources through removal of vegetation, slash piling, and use of tracked equipment. The main concern with these actions are the disturbances to soil. Soil displacement, compaction, or decrease in ground cover could cause an effect on watershed condition and aquatic habitat. To meet soil cover standards, limbs and unmerchantable timber would be left within the unit, which would increase soil cover and decrease the potential for soil loss.

Research findings suggest that the spatial layout of skid trails and surface cover are important factors in determining the effects of post-fire salvage logging on sediment yields, and particularly rilling. These are areas of focus in reducing hydrologic connectivity between post-fire logging-related disturbance and the drainage network. Creating a spatial layout of skid trails that does not, or is highly limited in crossing drainages, particularly for ephemeral drainages and swales high up in the landscape can limit rill erosion stream connection. This forces skid trails systems toward and onto ridgelines. Limiting rill erosion would be greatly desirable since rill erosion can dominate post-fire hillslope erosion. This kind of erosion can account for 60% to 80% of sediment delivered from hillslopes following wildfires. (Paper by Olsen in 2020).

Standard stream buffer widths may be insufficient immediately after severe fires with high soil burn severity, but effectiveness is likely to improve with time, as vegetative regrowth occurs. In a recent publication by Robichaud (2020), researchers observed significantly greater rill length and sediment concentrations in burned landscapes, but these erosion processes declined after 2 years due to vegetation regrowth. Rill lengths over 300 ft, immediately following fires, were found in high burn severity areas. After just 1 year of vegetative recovery, these rill lengths were significantly reduced to 80 ft. Robichaud states that after 2-years post-fire, land managers can return to standard stream buffer widths, the often-used standard 50 ft buffer. It should be noted that from the time of the fire (August 2020) to the time actual logging may start (May or June 2022) we are approaching 2-year post fire conditions. This increased time between fire and equipment entry allows for additional cover through

vegetation regrowth and ground cover recruitment (such as tree, branch and bark fall), in high burn severity areas, as well as additional needle-drop, in moderate burn severity locations.

By prohibiting ground-based equipment from entering within 50-feet on each side of the stream channel (Streamside Management Zone, SMZ), this will significantly lower the effects that logging disturbance can have on rilling processes.

Additionally, this project will require retaining/recruitment of at least 70% ground cover (litter, duff, bark, branches, along with rock) in the riparian reserve and SMZ treatment areas. Which will also help lower logging disturbance on rill erosion. This can be done during implementation by leaving broken tops, branches and other dead vegetative debris on the ground. Mastication and chipping are other options to create ground cover. The Soils Report states this design feature of 70% ground cover will be helpful in prevention of erosion. This amount of cover was shown in the Soil's Report, reproduces bare Soil Erosion Hazard Ratings of high/moderate for bare soil in high burn severity areas to moderate/low ratings. Increasing slash or other runoff-resistant surface cover to waterbar outlets could help disperse concentrated run-off, capture sediment, and reduce connectivity to the stream network, particular when burned areas between skid trails and stream net-works have little ground cover (Olsen 2020).

A Water Erosion Prediction Project model (WEPP) was used to simulate an erosion profile for the SMZ/RR buffer. Results show that increasing ground cover in high burn severity units to 70% in addition to no ground base machine entry (50-foot SMZ) has three times less sediment leaving an intermittent Riparian Reserve (100-foot buffer) as compared to high fire severity with no treatment. The high fire severity with no treatment was ran with 45% ground cover (this is mostly due to the existence of surface rock content). See Table 8.

Table 8. Water Erosion Prediction Project (WEPP) Model Results for SMZ/RR Buffers

Scenario	Ground Cover	Sediment Leaving Profile lbs/ac	Difference of Sediment Leaving Buffer when Compared to Alt 2
Pre-Fire (no treatment)	100	0	No Fire
Alternative 1 and 3- High Severity, Post Fire	70	72	3 times less
Alternative 2 (No Action) High Fire Severity, Post Fire - No Treatment	45	214	n/a

In salvage units 5, 16, 20, 21, 251, 272 and 26, trees with complete mortality would be harvested. This includes the steepest units 16, 20 and 251. Units next to Forest Highway 7, the Snow Basin Recreation area, and in high dispersed use areas may have trees marked up to 70% or higher probability of mortality (units include 13, 33, 310, 29, 270, and 271). In Plaskett Campground (unit 311), trees may be marked for harvest at 50% or higher probability of mortality. Unit 311 is on very gentle ground on mostly 20-30% slopes (see Geology Report).

The roadside treatments emphasize reduction in hazards along roads, with the importance of keeping roads open. The large majority of hazard trees to be removed are dead or will likely die due to the fire. Any remaining live canopy removal, should be limited, particularly in riparian areas, which burned with less severity.

The acres of treatment in each watershed are relatively small at the HUC14 watershed scale. The highest proportion of treatment acres within a watershed is in the Lower Cold watershed, in which the Project units would occupy about 10% of the watershed. Atchison watershed is at 7%, followed by Blue Slide watershed at 4%. The remaining HUC 14 watersheds (White Hawk, Panther and Harvey Spring) are below 1% (Table 9). The suite of BMPs and DFs are designed to minimize soil displacement and transport off-site (see Project BMPs and DFs section of Hydrology Report and Appendix B of this EA).

No Action

Direct and indirect effects associated with not treating the units and roads in the Project would result in continued sedimentation from roads and further accumulation of forest material, increasing the potential for catastrophic fire.

Cumulative Effects

The analysis of No Action Alternative is the same as the existing condition, which indicates that potential for cumulative effects is present, due to the August Complex Fire. Project area watersheds are currently past their peak flow threshold. This indicates potential for erosive stream channel effects from a peak stream flow. However, the difference in peak flow cumulative effects between the Proposed Action and No Action Alternative is negligible.

Threshold of Concern

Five of the six watersheds analyzed exceed the "Threshold of Concern" (TOC) for disturbance in the current post fire condition due to the acres in both high and moderate SBS ratings and given the high number of acres of these watersheds with active slides. Note, the treatment units themselves were planned to avoid known and suspected unstable areas. Units are mostly on midslope to gentle ridge tops where slides in the area are rare. Most active landslides are within stream gorges (see Geology Report).

The Proposed Action alternative at the HUC 14 watershed level exceeds the TOC for five out of six watersheds when analyzed with the Cumulative Watershed Effects (CWE) peak flow model. However, three of the six HUC 14 watersheds will be below their TOC by next year, 2022. Changes between the No Action Equivalent Roaded Acre (ERA) and the Proposed Project ERA are very limited. This indicates that this Project would contribute very little to cumulative watershed effects, particularly peak flow erosion. Erosion and sedimentation with the Project would be very similar to what they would be due to the fire. Further, note in Table 9, the year of recovery to below the TOC is the same for both Alternatives.

Table 9. Cumulative Watershed Effects Results - HUC 14 Watersheds

Regional Water Quality Control Board	Watershed HUC14	Alt 1 &3 % ERA (2022)	Alt 2 % ERA (2022)	% TOC	Year below TOC	% ERA due to Project Treatment (2022)	% WS with Project Treatment
North Coast (Eel River)	Atchison	11.3%	10.5%	3.7%	2027	0.7%	7.4%
	Blue Slide	10.0%	9.6%	5.5%	2024	0.3%	4.2%
	Lower Cold	9.9%	9.5%	8.9%	2023	0.8%	10.1%
	White Hawk	8.1%	8.1%	5.6%	2023	<0.1%	<0.1%
Central Valley (Sacramento River)	Panther	4.7%	4.7%	7.8%	2020	<0.1%	0.4%
	Harvey Spring	6.3%	6.1%	1.9%	2027	<0.1%	0.8%

Modified Proposed Action

Given, that Alternative 3 contains the same unit boundaries and activities as Alternative 1 with a refinement to retain more burned trees while providing for hazard tree mitigation, there is no difference in effects, hydrologically, as compared to Alternative 1.

Summary of Effects

The effects from all alternatives exceed each watershed's Threshold of Concern. Alternative 2 has slightly lower cumulative effects, but is the more susceptible to future catastrophic wildfires due to heavy fuel loads. Alternative 1 and 3 would have somewhat more cumulative effects, but would have the most impact in reduction of fuels; thus, reducing the possibility of catastrophic wildfires or reburns in future years.

Watershed effects, in terms of possible increased peak flows, as a result of the proposed action have been analyzed using the Cumulative Watershed Effect (CWE) process as required by USDA FSH 2509.22, Soil and Water Conservation Handbook, Chapter 20- Cumulative Off-site Watershed Effects Analysis (USDA Forest Service 1990). For the purpose of this analysis, short-term effects are considered to last no more than 3 to 5 years. Given that the proposed action is in 2022 and that the longest time for peak flow effects is 2027, there are limited short term effects.

4.7. Recreation and Visuals

The Plaskett-Keller Project is in and around Plaskett Meadows Campground and Snow Basin Recreation Residence Tract. The recreation areas within the project area receive heavy use by spring, summer and fall recreationists, with (camping developed and dispersed), fishing, and fall hunting. Dispersed area camping greatly increases during seasonal fall hunting.

The project area includes the following developed sites: two campgrounds (Atchison and Plaskett Meadows), Plaskett Meadows Day Use Site, four non-motorized trails, Telephone Camp dispersed Camping Area, and 13 recreational residences within the Snow Basin Tract. The Plaskett Campground is ranked in the top three in terms of popularity and use for the Grindstone Ranger District. Following the 2020 August Complex, several public safety closure orders were enacted to address public safety from the fire itself and hazards, such as standing dead trees and snags. The current public safety closure order 08-20-15, which closes several recreation sites, was authorized after the fire with a two-year duration.

Vegetation pattern and species is diverse, with Douglas-fir/white fir mixed conifer forest most dominant in the Plaskett and Snow-Basin area, and Douglas-fir/ponderosa pine mixed conifer forest most dominant along the 22N11 Atchison area. The past 100 years of wildfire suppression has caused some forested areas to be extremely overstocked and dense. Vegetation density obstructs views through the forest understory, and contributes ladder fuels increasing the risk of extreme wildfire events.

The August Complex substantially affected the scenic character of the project areas, as described in the EA. High severity fire created large areas of standing dead and dying trees, blackened tree boles and brush patches, and bare mineral soil. With nearly all the vegetation burned in these high severity areas, there are now open views of the landscape, exposing scorched, barren landforms and rock outcrops. Although some trees have survived the fire, large-scale or high intensity wildfires, and insect or disease outbreaks are considered negative visual disturbances to the valued landscape character and scenic integrity (Ryan 2005).

Recreation Opportunity Spectrum (ROS)

The inventoried Recreation Opportunity Spectrum classes for the planning area are Roaded Natural and Semi- Primitive Motorized. The vast majority of the planning area is Roaded Natural aside from a small amount of semi-primitive motorized on the western edge one-half mile from roads maintained for use by highway vehicles consisting of harvest unit 26, roadside unit 22N11A, and road side unit 22N11. As the LRMP dictates that the planning area be managed consistently with ROS class, recreation opportunities in the planning area must remain consistent with the description of the Roaded Natural opportunity class as laid out in the ROS Users Guide:

The Roaded Natural setting is described as:

> Area is characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities. (USDA FS 1982)

The user's experience in this setting is expected to be:

> About equal probability to experience affiliation with other user groups and for isolation from sights and sounds of other humans. Opportunity to have a high degree of interaction with the natural environment. Challenge and risk opportunities associated with more primitive types of recreation are not very important. Practice and testing of outdoor skills might be important. Opportunities for both motorized and non-motorized forms of recreation are possible. (USDA FS 1982)

Furthermore, Roaded Natural areas are within one-half mile of "better than primitive" roads, and the environment is expected to be modified by humans, although these modifications should be largely unnoticeable from sensitive travel routes. A moderate to high frequency of contact with other recreationists is expected on roads, and a low to moderate contact frequency is expected on trails and off routes. (USDA FS 1982)

The Semi-primitive Motorized Class is described as:

> Area is characterized by a predominantly natural or natural appearing environment of moderate to large size. Concentration of users is low, but there is evidence of other users. The area is managed in such a way that minimum on site controls and restrictions may be present but are subtle. Motorized use is permitted.

The user's experience in this setting is expected to be:

> Moderate probability of experiencing isolation from the sights and sounds of human; independence; closeness to nature; tranquility; and self-reliance through the application of outdoor skills in an environment that offers challenge and risk. Opportunity to have a high degree of interaction with the natural environment. Opportunity to use motorized equipment while in the area. (USDA FS 1982)

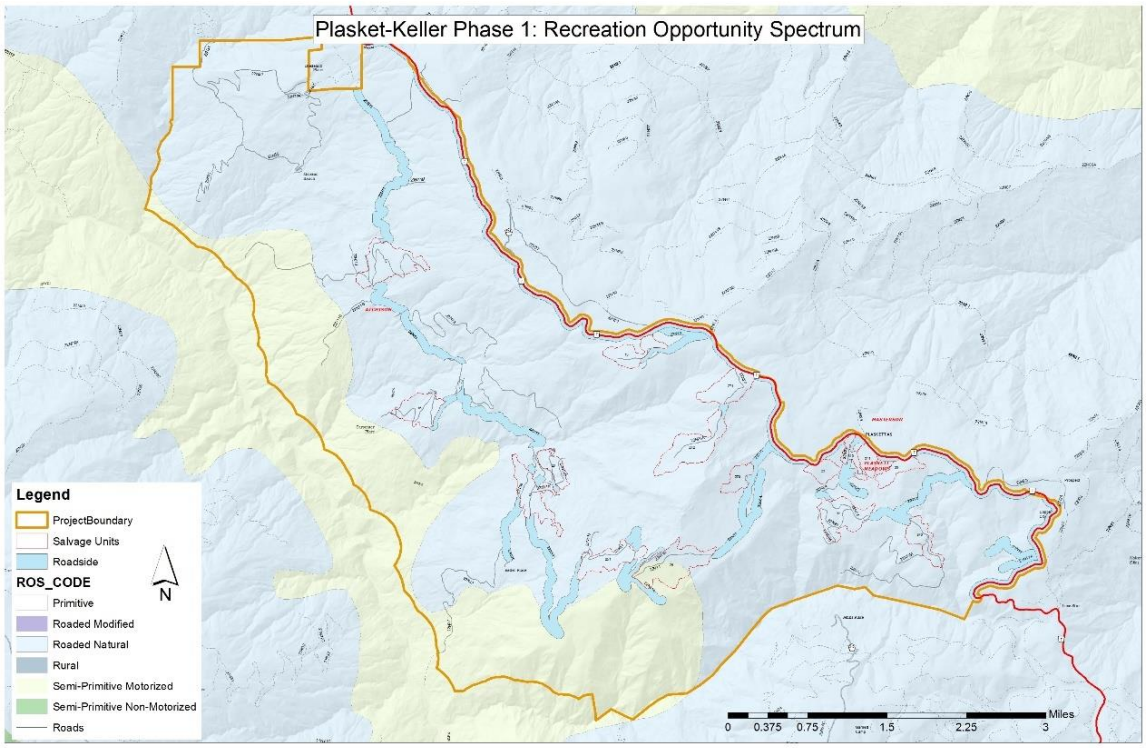


Figure 18. Plaskett-Keller Project and Recreation Opportunity Spectrum

Visual Quality Objectives –VQOs

Four Visual Quality Objectives (VQOs) are designated in the Forest Plan: 1) Preservation, 2) Retention, 3) Partial Retention, and 4) Modification. Existing natural and built features were considered when VQOs were assigned to the landscape during the development of the Forest Plan. The Forest Plan requires the Forest Supervisor approval through the environmental analysis process for any deviations from VQOs assigned to the landscape. Agriculture Handbook Number 462 (USDA Forest Service 1974) provides a description of the VQOs. The designations of the Plaskett-Keller Project Area are: retention, partial retention, and modification. There are no Preservation designations within the Plaskett-Keller project area.

Retention – This visual quality objective provides for management activities which are not visually evident. They are typically are found: (1) in the foreground of high visual sensitivity roads, trails, etc., (2) in the foreground or middle ground of areas around Plaskett Meadows and Snow Basin Recreational Residence Tract, Black Butte Trail, and Atchison Campground. These roads and trails typically receive high levels of public use, or access recreation sites or areas with visually pleasing scenery Under retention activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc. should not be evident.

Partial Retention – Affects most treatment units visible from roads and provides that management activities remain visually subordinate to the characteristic landscape when managed according to the partial retention visual quality objective. Activities may repeat form, line, color, or texture common to

the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape. Activities may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape.

Modification – Consists of most of the project area that is not visible from recreation sites and major travel routes and provides management activities may visually dominate the original characteristic landscape. However, activities of vegetative and landform alteration must borrow from naturally established for, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type. Additional parts of these activities such as structures, roads, slash, root wads, etc., must remain visually subordinate to the proposed composition.

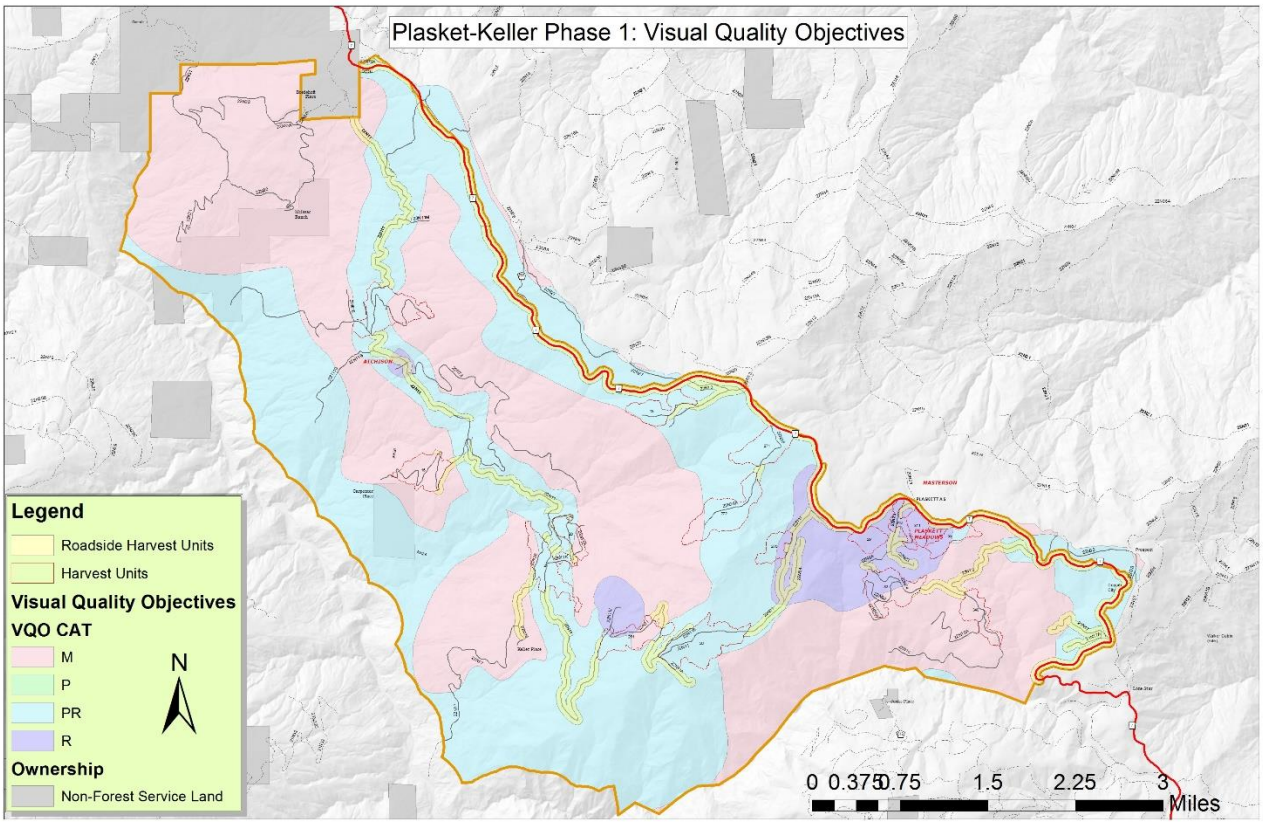


Figure 19. Plaskett-Keller project area and Visual Quality Objectives.

4.7.1. Environmental Consequences

Proposed Action

Direct and Indirect Effects

Under the Proposed Action, users would be affected by short-term disruptions and displacement during project implementation. The effects would likely begin shortly after completion of the Environmental Assessment.

The removal of larger hazard trees along system roads and through treatment units, would reduce hazards along open corridors and recreation sites for future public use, and increase views along these areas, especially where a higher number of trees are removed. In other areas, where only individual or isolated trees are removed, there would be little change or effect to overall scenic character. Fuels treatments will further reduce the amount of small tree and shrub skeletons Ground disturbance, tree stumps, and trees felled and left in place would be noticeable in the short term. Within three to five years, seasonal leaf and needle cast, weathering (graying) of tree stumps and chips, and resprouting of vegetation or "greening up" would soften these effects.

The removal of dead and dying trees would create large openings within adjacent burned or forested areas. This treatment targets areas impacted by high-severity fire, with all or nearly complete mortality. Individual larger snags and clumps would be retained for wildlife resources. When viewed, these clumps and snags, depending on how many are retained, would provide additional texture to the openings. Logging systems may also influence noticeable visual contrasts. For example, cable systems typically create linear contrasts from skidding and cable corridors, while ground-based logging may create soil color contrasts during operations.

Small trees (14 inches in diameter at breast height or less) and other understory vegetation would be treated mechanically, or by hand. Slash would be piled and burned, lop and scattered, or chipped. Visual impacts from hand-piling and burning may create color and texture contrasts in areas of disturbed soil. Removing understory vegetation would open views into the forest and of the forest floor. In high severity burned areas, seasonal leaf and needle cast, weathering (graying) of tree stumps and chips, and vegetation regrowth, or "greening up" would soften these effects in three to five years.

Forested areas affected by high severity wildfires would be replanted if the area is salvaged. While this would be a Phase 2 project (not yet defined), planting would accelerate the recovery of burned areas through vegetation reestablishment. This is consistent with the desired scenic character of restoring a more visually diverse forest condition, which is also connected with improved forest ecosystem function.

The current closure order would remain in place until hazard trees are felled. Additional short-term closure orders affecting areas where logging is occurring or haul routes are possible.

In areas cleared of hazards and open to public access, harvesting and road maintenance activities would impact recreation use during the summer and fall from localized noise, dust, and increased traffic. However, recreationists would likely shift their use in the short-term to nearby NFS lands away from areas impacted by proposed activities to maintain their recreational experience.

Recreational deer hunting opportunities in fall/summer 2021 would be affected by localized dust and noise from project implementation.

The Proposed Action would decrease the short- and long-term road maintenance needs within the project area while providing funding for road maintenance by salvaging dead and hazard trees alongside roads open to motorized recreational use. Long-term recreational opportunities of the Forest managed sites would return to pre-fire levels after hazard trees are removed. No changes in ROS classifications would occur under the Proposed Action.

Cumulative Effects

Ongoing activities, such as road use and maintenance, trail use and maintenance, and fire suppression, would be expected to continue within the project area. Minor disruptions and/or displacement to recreational users in the project area may occur with ongoing activities; however, these disruptions would be minor and have occurred historically. Some road and trail projects are planned under the August Complex BAER (Burned Area Emergency Response program), and these BAER projects would create additional disruption and displacement with activities associated with developed recreational facilities planned for 2021. Actions proposed under the Plaskett-Keller Project, including harvest, fuels treatments, and road maintenance, would lead to additional disruption and displacement of recreationists. Proposed actions under the Plaskett-Keller Project would mostly likely impact recreation use during the summer from localized noise, dust, and increased traffic. However, recreationists would likely shift their use in the short term to nearby NFS lands away from areas impacted by proposed activities to maintain their recreational experience.

This project would accelerate the achievement of Forest Plan desired conditions to perpetuate ecologically established scenery. Eventually, reforestation would accelerate ecosystem and scenic restoration, and fuels reduction treatments would reduce the likelihood of future high intensity wildfires. The project would meet Forest Plan Visual Quality Objectives (VQOs) in the long term.

In the short-term, noticeable visual disturbances from the salvage harvest associated with site preparation with heavy fuels and roadside and recreation hazard treatments in Retention VQO areas and some Partial Retention VQO areas would likely not meet their assigned Visual Quality Objectives (VQOs). Although this appears inconsistent with Forest Plan Standards and Guidelines, they are excepted, following catastrophic events (i.e., August Complex). These disturbances would eventually revegetate over time (10 years) and meet Retention and Partial Retention VQO. Integration of design features ensures this project is consistent with Forest Plan scenery long-term desired conditions and direction.

No Action

Under the No Action Alternative, public safety closure order 08-20-15 would remain in place and additional closures would be expected annually as hazards are evaluated. Road, trail, and facility maintenance costs would also increase under this alternative, and road and trail closures would occur to address hazard trees. The developed recreation sites and trails managed by the Forest would experience reduced use opportunities until hazard trees along their access roads were cleared annually. No changes in Recreation Opportunity Spectrum (ROS) Classifications or violations of Visual Quality Objectives (VQOs) would occur under the No Action. While there would be no effects to the VQOs, changed condition associated with the fire remains and will change slowly over time.

Direct and Indirect Effects

The No Action Alternative would disrupt and displace recreational users. Public safety closure Order 08-20-15 would remain in place, and additional closures would be expected annually for the foreseeable future as roads, trails, dispersed camping areas, and campgrounds are evaluated for hazards. Motorized Routes could be affected by periods of inaccessibility from tree breakage and downed trees. Access to other recreational areas via FH 7 would be disrupted from intermittent closures.

Cumulative Effects

To date, users have been displaced from the project area twice because of the August Complex Fire; first, when the fire was still active; then, because of public health and safety closures. Under the No Action Alternative, users would likely be displaced from the project area for a longer period because hazards would take longer to eliminate (5-20 years) with the current workforce and funds available. BAER activities planned for 2021 would reduce hazard trees in the developed campgrounds and administrative sites, with some short-term disruptions and displacement.

Modified Proposed Action

Effects under this alternative would be similar to Alternative 1. While fewer potential snags within the interior would be removed, safety would still be addressed along roads and developed recreation areas. However, potentially more snags and falling trees would reduce opportunities for safe dispersed recreation and camping in units 13, 29, 33, 270, 271, and 311.

4.8. Silviculture

Background

Complete environment description addressing preexisting forest conditions was previously reported in Black Butte Watershed Forestry/Silviculture Report for Black Butte Wild and Scenic Plan (Saba 2017). Definitions and characterization of vegetation are addressed in publicly available CALVeg data as Cover Type (Table 10). This summary consists of description of vegetation existing prior to 2020 August Complex. The Plaskett-Keller Phase 1 Project Area can be characterized using seven different cover types, with conifer forest (CON) being most dominant, and water bodies (WAT) occupying least amount of the project area (Figure 20).

Table 10. CALVeg Cover Type for the Project Area calculated prior to project scoping. (values rounded to the nearest acre).

CALVeg Cover Type	Code	Acres (scoping)	Proportion of total (%)
Conifer forest/woodland	CON	6,251	40
Hardwood forest/woodland	HDW	3,631	23
Mixed conifer and hardwood forest/woodland	MIX	2,736	18
Herbaceous	HEB	1,903	12
Shrub	SHB	894	6
Barren [Rock/Soil/Sand/Snow]	BAR	93	1
Water	WAT	10	0
		15,518	**100**

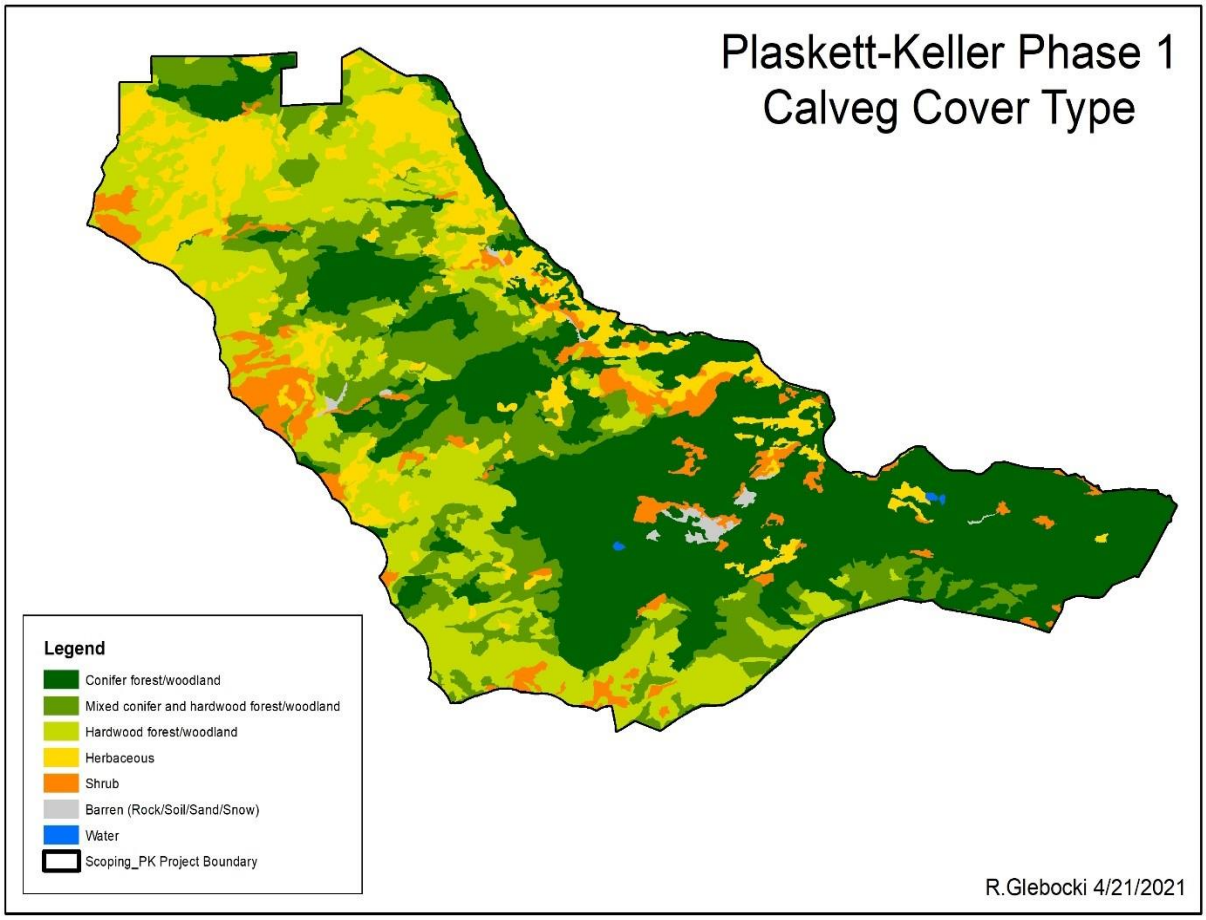


Figure 20. CALVeg Cover Type for project area.

With people's safety in mind, the abatement of roadside hazards is likely to occur irrespectively of forest cover type. Proposed salvage operations however, are strongly correlated with presence of conifer species. Analysis of Society of American Foresters (SAF) cover type classification identified four major cover types making up approximately 95% of proposed treatment area (Silviculture Report) including Red fir, Sierra Nevada mixed conifer, White fir, and Pacific ponderosa pine – Douglas-fir.

Digital records of forest management in the project area date back to 1960 (USFS-FACTS database). Approximately 2,070 acres have received some form of active management (on the ground activity) prior to August Complex fires. In general, these activities can be categorized as Reforestation, Silviculture, Timber, and Fuels (Figure 21).

Recorded timber-focused activities include commercial thinning, overstory removal, patch clearcut, sanitation cut, single tree selection, and stand clearcut. Most recent timber producing activities occurred in the late 1980s. The majority of timber operations require a follow-up reforestation to maintain tree stocking within thresholds specified by LRMP for given Management Area and overarching management objective.

Recorded reforestation activities include site preparation – either mechanical or by burning, planting, replanting or fill-in planting, animal control, tree release and weed, and fertilization. The most recent planting efforts took place in 2000.

Other silvicultural activities include precommercial thinning, the most recent in 2017.

Finally, and most recently (2019), portions of the area were managed for fuels. Fuels activities include tree pruning, thinning for fuels reduction, rearrangement, chipping, compacting or crushing, piling of fuels by hand or machine, and pile burning.

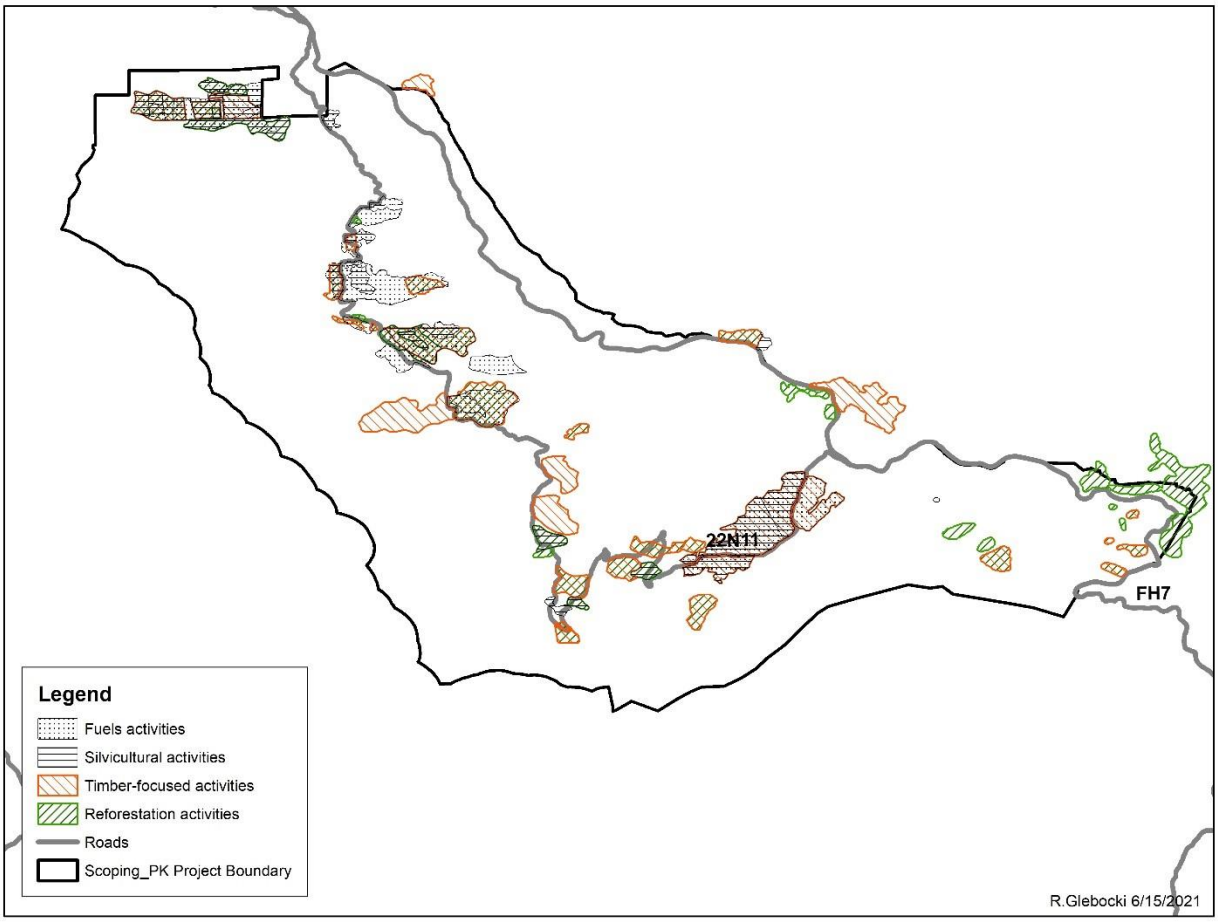


Figure 21. Management history of project area (dating back to 1960).

The effect of fire on vegetation utilizes information provided by Rapid Assessment of Vegetation Condition after Wildfire (RAVG). Supplementing RAVG is the Regional post-fire analysis combining vegetation attributes with effects of fire. Of the three products provided by a RAVG analysis, Canopy Cover (CC) loss, Composite Burn Index (CBI), and Basal Area (BA) loss, the change in tree Basal Area loss due to fire is the most applicable for this analysis.

The RAVG data predicts basal area loss through a change detection process using two satellite images captured before and after a wildfire (Miller et al. 2009). Basal area loss does not describe a permanent loss of basal area within a forest, but simply describes the amount of change in the live tree cover shortly (30-45 days after wildfire containment) after a wildfire undergoes RAVG analysis. Resultant 30-meter resolution raster data is then classified based on the cell value representing percent basal area loss. Varying thresholds of mortality are then simplified into two levels of BA classification: a more detailed 7-class percent Basal Area loss, and a broader 4-class percent Basal Area loss. Subsequent analysis utilizes the more general, 4-class approach (Figure 22 and Table 1 of this EA).

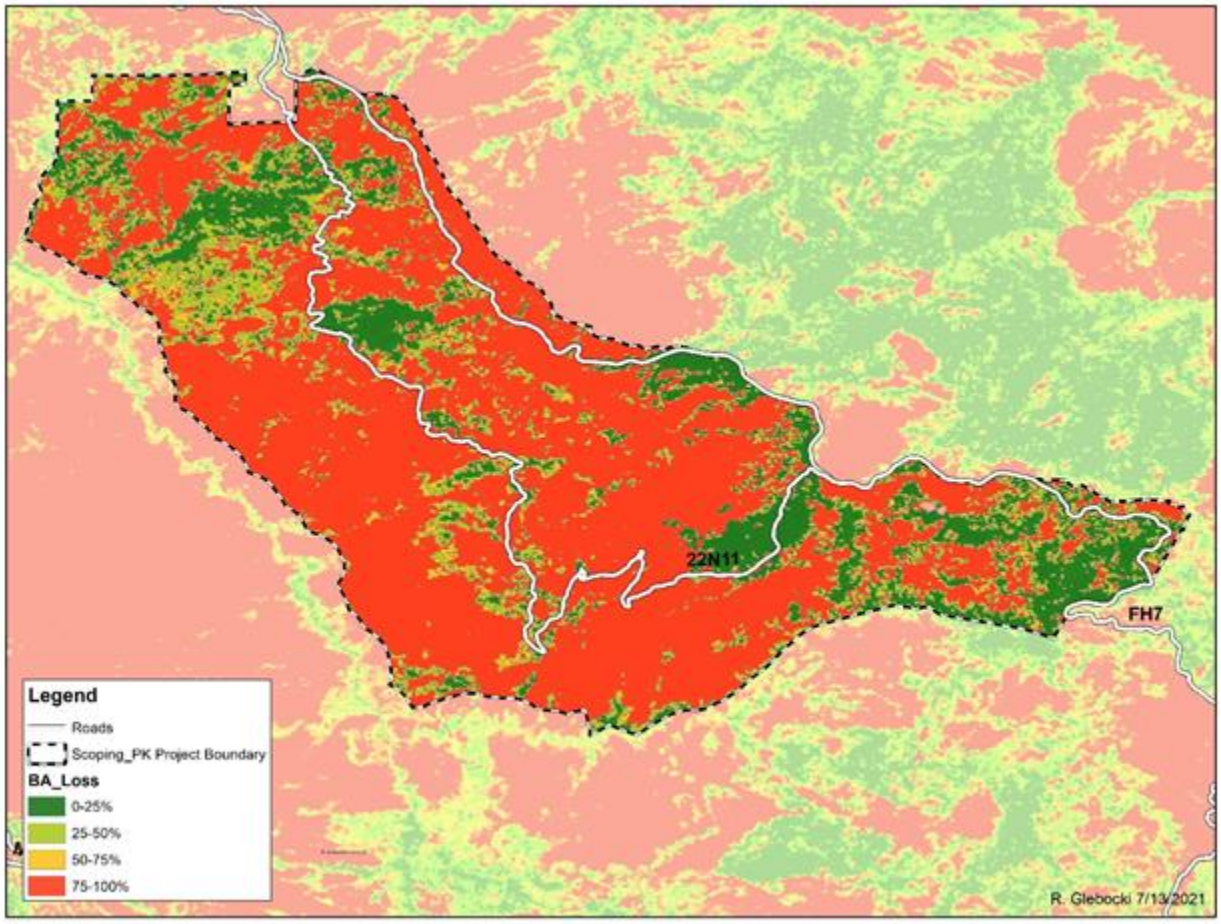


Figure 22. RAVG layer showing 4-class Basal Area Loss within the project area (darker coloring), and vicinity (translucent coloring).

Evaluation of Dead and Dying Trees - Probability of Mortality (Pm)

The "Marking Guidelines for Fire-Injured Trees in California" (Smith and Cluck 2011 (amended 2021)) were recommended by Region 5 Forest Health Protection staff for use to identify dead and dying trees in the Plaskett-Keller project area. Additionally, the "Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region" (Angwin et al. 2012) define failure and target potential and were provided for use to identify trees to be removed along roadside. Both guidelines can be used in combination along roadsides and other infrastructure to abate existing hazard trees due to defect, and to remove trees that are likely to die from fire injuries and pose a hazard in the near future.

Dead and dying trees are identified and selected for removal using model-based metrics that predict Probability of mortality (Pm). Trees are evaluated based on their diameter and species, and on crown length scorched (for yellow pine), crown volume killed (for Douglas-Fir and lodgepole pine) and crown length killed (all other species to be evaluated in this project). Additionally, model considers presence of ambrosia beetles, and timing of the fire. The probability of mortality levels derived from these guidelines are thresholds where trees within utilization standards that meet or exceed a selected Pm level are selected for removal.

Silvicultural prescriptions

To accommodate multiple management objectives within the project area, and to provide efficient response to fire-related tree mortality, the Plaskett-Keller Project utilizes four silvicultural treatment prescriptions, Pm50, Pm70/90, Pm100, and Research. Each proposed treatment area (Unit) is assigned a prescription based on unit location as well as predominant fire severity within the unit (Figure 8 and Figure 9).

Within unit complexity associated with varying levels of mortality is addressed by marking of individual trees for retention or removal using Designation by Damage Class (DxDam). This strategy also incorporates Cut Tree Mark (CTM) or Leave Tree Mark (LTM) to minimize potential bias in tree selection and to improve implementation (Table 11).

Table 11. Probability of mortality (Pm) and total unit acres. Acres rounded to the nearest whole acre.

Prescription (Rx)	Pm	Unit	Acres	Description	Total acres
Pm 50	50%	310	22	DxDam + CTM	22
Pm 70/90 (Pm 70 for Alt 1)	70% 90%	311*	26	DxDam + CTM + LTM	238
		29*	29	DxDam + CTM + LTM	
		33*	33	DxDam + CTM + LTM	
		270*	31	DxDam + CTM + LTM	
		271*	68	DxDam + CTM + LTM	
		13*	51	DxDam + CTM + LTM	
Pm 100	100%	5	102	DxDam + LTM	684
		16	63	DxDam + LTM	
		20	34	DxDam + LTM	
		21	76	DxDam + LTM	
		251	64	DxDam + LTM	
		26	114	DxDam + LTM	
		32	81	DxDam + LTM	
		340	47	DxDam + LTM	
		272	103	DxDam + LTM	
Research	varies	varies	23	see Proposed Action - Research	23

*Under Alternative 1, these units would be marked using Pm 70 with no differentiation between the unit interior and roadside.

Pm 50. This threshold was selected for trees in unit 310, a 22-acre area encompassing Plaskett Campground. This approach would emphasize immediate safety concerns and limit the need for future tree removals at this highly used campground (Figure 23).

Pm 70/90. Units adjacent to high-use or high-travel areas would be marked according to two mortality thresholds. Pm 90 would be implement throughout the unit interior. Retained living trees would continue to provide multitude of ecosystem services, while benefiting from decreased competition. Pm 70 would be implemented along the roads, where safety is a primary concern. This prescription emphasizes safety by allowing removal of dead trees, as well as trees that are most likely to die in the near future.

Pm 70 would also be applied to all identified roadside areas where hazard tree abatement will be necessary. These areas are dispersed along main travel routes and only in few instances might provide timber salvage opportunities. The extent of potential roadside hazard treatments will be further limited

by the location of dead and dying trees in relation to the road or other infrastructure. In general, only trees within 1.5x tree height from the road or infrastructure will be considered for removal. Tree height can be determined either for individual tree, or if a group of trees is to be treated, it can be derived using available LiDAR crown model, and averaged for the given stand.

Pm 100. In general, areas furthest from the main travel route, Forest Highway 7 (FH7), focus primarily on salvage of timber. To expedite the process of identifying trees that are subject to removal, 100 percent Pm was used. This will prevent removal of any trees that may live and may continue to provide wildlife habitat and seed source for natural regeneration.

Research Rx. Final variation in treatments pertains to initiated fuels study (research plots). In brief, Units 26, 271, and 272 have three approximately 3-acre each monitoring plots installed within their boundaries. Each plot set consists of a control (Rx1), where no treatment will occur, full salvage (Rx2), with salvage specifications as assigned to the unit given plot is in, and modified salvage (Rx3), where timber removal is limited to trees not exceeding 20.9” DBH.

Figure 23. View of area along Plaskett Lake adjacent to the campground.Multiple resource concerns are addressed through consultation and implementation of best management practices.

4.8.1. Environmental Consequences

Proposed Action

The Proposed Action proposes salvage harvest on approximately 1,173 acres of previously forested land. Majority of the proposed treatment area burned with high fire severity, resulting in greater than 75% basal area loss. This acreage consists of 944 acres across 16 identified treatment units varying from 22 to 114 acres in size. Additional 229 acres of high severity “pockets” are directly adjacent to major travel routes through the Forest. Preliminary timber cruise report for the proposed treatment areas indicates

that salvage harvest would result in removal of approximately 14.8MBF (million board feet) of merchantable timber (net volume), meeting the third objective of the PA – providing a supply of timber.

While the bulk of fire-killed and damaged trees would be removed as timber product, there is also associated removal of "non-sawtimber," consisting of sub-merchantable cull material, tree tops, logging slash, etc., often referred to as biomass. Preliminary timber cruise report indicated that approximately 0.8MBF (net volume) of biomass could be removed during logging. Both, merchantable timber and associated biomass, can also be viewed as fuels. Removal of salvaged timber, disposal of slash, and overall reduction in biomass meet the second objective of proposed action by greatly reducing fuel loading, thus impacting potential fire behavior (Stephens et al. 2009, Coppoletta et al. 2016).

Providing for safety of the public as well as FS personnel is the primary objective of the PA. Removal of dead and dying trees using timber salvage as a tool provides the most efficient way of addressing safety concerns imposed by the magnitude of this fire. Proposed treatment areas alone would ensure hazard tree abatement along approximately 15 miles of FS roads, with additional 15 miles (corresponding to approximately 1,120 acres of potential treatments) of roads where hazard trees and fuels would be monitored and treated. Seven of the proposed 16 treatment units overlap, or are in close proximity to a developed campground, popular dispersed camping sites, or summer cabins.

The role and the effects of timber salvage in forest management are a continuous subject of debates. Proposed Action's fourth objective provides an opportunity to enrich our knowledge by monitoring and gathering data in a long-term study. Analysis of this information would greatly contribute to the state of knowledge at a localized – Forest level, and larger landscape in general.

The impact of the Proposed Action (timber salvage) on forest vegetation, tree cover in particular, is limited. Majority of the project targets areas with total tree mortality. Areas with mixed mortality (low and moderate fire severity), consist of either dead trees or trees that were individually assessed and marked for either retention or removal according to Forest Service Regional guidelines.

Because this is a very recent fire event, the natural regeneration of tree species is still absent from the area, thus unaffected by the Proposed Action. Sprouting hardwood trees, where present, are not targeted by the proposed action, and if deemed a non-hazard, are usually left on site contributing to diversity and quantity of remaining tree snags. If mechanized operations are delayed into the future there is a potential for damage to recovering vegetative cover (Laacke and Fielder, 1986). Potential for damage or mortality to establishing tree seedlings is highest in areas of concentrated mechanized activities – mainly skid trails and landings (Donato, 2006). Conversely, McIver and Starr (2001) suggested that ground disturbance from postfire logging can also encourage establishment of plant species.

Proposed activities have also indirect effects stemming from removal of standing dead and dying trees, and can positively affect future management objectives. The not yet defined Phase 2 of post-fire recovery is likely to focus on reforestation and development of a defensible fuel break. Adequate site preparation is a crucial step in planning any reforestation activities (Stein, 1995). At the minimum it would involve removal of dead trees (for the overhead hazard mitigation, and for protection of seedlings from crushing and future fires), and control of competing vegetation. Having a strategically located and effective fuel break could be a critical factor in fire management and suppression. Proposed timber salvage and fuels treatments in proposed units along Forest Highway 7 would greatly contribute to our ability to manage future fire.

Mitigation measures

There is a suite of best management practices and mitigation measures imposed by silviculture and other resources, ensuring that potential impact of ground disturbing activities is avoided, minimized, or mitigated. These measures are based on known information and field reconnaissance, available science, public feedback, industry practices, etc. The aim is to reduce the impacts to residual standing trees, existing vegetation, and surrounding areas. Some of these measures include:

- Individually assessing and marking living trees for either retention or removal.
- Directional felling of trees to reduce damage to remaining live trees.
- Protection of all hardwood species.
- Protection of existing and recovering vegetation through approved placement of skid trails and landings.
- Maintaining post-treatment surface cover utilizing created litter and fine woody debris.
- Treatment of cut stumps with borate compound to prevent Heterobasidion root disease where applicable (Appendix C, Silviculture Report).
- Retaining snags, snag clumps and large coarse woody debris.

Cumulative effects of proposed action

The area considered for the cumulative effects analysis includes project area in its entirety, and the footprint of the adjacent Cold Springs Salvage project. The Cold Springs Salvage is a 225 acre Categorically Excluded project overlapping the matrix portion of previously thinned Smokey project. The objective of Cold Springs Salvage is analogous to Plaskett Keller Project – hazard tree mitigation, fuels abatement, and salvage. However, there is currently no scheduled implementation of the Cold Springs project.

The silviculture cumulative analysis area borders private property to the north, Buttermilks Late Seral Reserve to the east, and Black Butte Wild and Scenic River corridor to the west; all with low likelihood of any silvicultural treatments in the near future. The additive effect of past, present, and reasonably foreseeable silvicultural activities have, and will continue to shape future landscape and stand conditions of the project area. Forest vegetation within the analysis area, tree cover in particular, has been influenced by the major factors: past timber and fuels management activities, fire management and suppression, and the August Complex Fire of 2020. The effect of forest densification resulting from lack of active management and fire suppression has likely been a contributing factor in subsequent high severity patches – a primary target of the Proposed Action.

The effects of Proposed Action and attainment of specified project objectives can be viewed in the context of measurable indicators: miles of roads treated and hazard trees removed (safety objective), acres treated where fuels are reduced to no more than 10 tons per acre (see Fuels report) (fuels objective), and volume of timber removed (economic recovery). The proposed research objective does not have a quantifiable indicator. Successful implementation of the project would also lead to creating reforestation opportunities, ensured continuous access to public use areas, and reduced fuel loads throughout analysis area.

No Action

The “No Action” alternative implies that none of the proposed treatments would take place, therefore there would be no direct effect on current and near-term forest conditions. Not removing dead and dying trees in the project area would result in not meeting any of the project objectives. Most evident effect would be associated with not addressing hazard trees. While it is possible to determine if the tree

is going to die with a degree of certainty, it is nearly impossible to determine if and when a dead or damaged tree is going to fall. Anecdotally, remaining live trees are subject to increased exposure to winds, making them initially prone breakage and toppling over (Figure 24). The Forest Service is mandated to provide for public safety on publicly accessible FS managed lands (Recreation Report). Threat to public, and FS personnel safety could be a result of tree falling across the road or the campsite.

For the owners of private properties just outside of the project area, as well as summer cabins within the project area, this threat may also come from the lack of fuels management prior to subsequent fire event. Similarly, because of fuels accumulation surrounding remaining areas of low to moderate fire severity ("green patches"), there would be an increased threat from potential future fires.

Retention of standing dead trees and excess buildup of fuels has also a detrimental effect on forest recovery. The first would result in conditions hazardous for people to work in for several years after the fire. Delaying the abatement of overhead hazards could also be prohibitively expensive as the options get progressively more limited: from direct tree felling with chainsaw, the use of mechanized equipment, planned reburns, to use of explosives. The second, in conjunction with recovering vegetation, in case of a reburn, could result in loss of naturally recovering or planted tree cover (Lydersen et al. 2019). This was evidenced in forest plantations following the 2012 Mill Fire on the Mendocino National Forest. Vast majority of trees planted in 2015 was lost due to fire intensity of 2018 Ranch Fire, resulting from burning of the understory vegetation intermixed with residual fuels.

Figure 24. Toppled Tree. Approximately 5 feet in diameter Douglas-fir, underburned, with green crown. Located in the area of moderate fire severity just outside of Plaskett-Keller Project area, and blocking Forest Highway 7. Mitigation of this downed tree took about a week since reporting, due to technical difficulty of

bucking a large tree, and the need for using heavy equipment to move cut pieces. (Photo credit: E. Dolhansky, 03-05-2021).

Cumulative effects of no action

In the context of miles of roads where hazard trees are abated, acres treated as fuels, and timber volume removed, lack of management action would retain all interior standing dead trees, thus not meeting any of the project objectives. Remaining dead trees would contribute to fuel buildup, and in case of future fire – potentially catastrophic results. Resultant fuel loading would render the potential fuel break (considered for future phases of post-fire recovery) a not effective proposition.

The removal of hazard trees would still have to take place along travel routes, and where they can affect the infrastructure. This will add to the burden of maintaining passable roads and accessible areas in terms of labor and financial expenditures. It is important to consider the scale of this project in the context of similar work needed across the entire Forest affected by both Ranch Fire of 2018, and August Complex of 2020.

Additional consideration should be given to cumulative effect on recovering vegetation. The natural recovery of tree species is dependent on available seed sources (or sprout base in case of hardwoods). In high severity patches, that seed source is not present, and regeneration material comes from trees in adjacent, less severely burned areas. Based on the distance to seed source, and size of high severity area, it might take several years for seedlings to establish, and area to recover. Even with successful recovery of forest species, fuel loading that resulted from deterioration of dead trees will have detrimental effect on survival of established seedlings if fire is to occur

Change in species composition following fire of this magnitude and severity is likely to occur (Coppoletta et al. 2016). For Plasket-Keller area, shift is likely to occur in favor of white fir. This species was previously abundant in the area and dominated higher elevations. Being a prolific seeder, as well as partially shade tolerant species, white fir dominance will be even more apparent in the future. Shift in composition, and of particular concern to forest managers, is rapid recovery of shrub species, which sprout readily following fire. Although pre-fire tree densities, high elevation, and regular snow cover kept shrub component suppressed, species such as manzanita and whitethorn will likely benefit from decreased resource competition from trees.

A major concern in California is the potential for severely burned forestlands to remain dominated by large shrub fields for long periods after fire and to be maintained as shrubs by subsequent fires (see above). Another key concern is the potential for insufficient conifer regeneration, particularly of pine species that may be dispersal limited or outcompeted by more shade-tolerant taxa such as white fir and Douglas-fir that can better tolerate rapidly expanding shrub canopies. Collins and Roller (2013) and Welch et al. (2016) reported that success of conifer regeneration, particularly of pine, was poor in many high-severity burn patches in recent wildfires in the Sierra Nevada and southern Cascade Range.

Modified Proposed Action

Following public feedback, a change to Pm 70 prescription affecting 6 units along FH7 and Snow Basin cabins was made. New prescription differentiates between unit interior and the roadside areas - allowing for retention of trees not exceeding Pm 90 in the unit interior. Because of the location and overarching safety/fuels objective of those units, it is still necessary to limit the number of trees that are likely to die,

thus contributing to future fuel loads. Retained living trees will continue to provide ecosystem services or become snags in the future.

4.9. Soils

Inceptisols occupy about 91% of the project area. These are “young” soils, exhibiting only moderate degrees of soil weathering and development. These soils have altered surface horizons that have lost base minerals or iron and aluminum, but have minimal subsoil development from eluvial/illuvial pedogenic processes. Inceptisols are shallow and occupy steep upland slopes with high rates of geomorphic (natural) erosion, offsetting soil profile development. These soils are in equilibrium with their environment and will not “mature” until their environment changes.

Mollisols occupy about 6% of the area. Mollisols are soils that have a thick surface horizon with higher levels of soil organic matter. They commonly form in grasslands and are highly productive.

Entisols occupy about 2% of the area. Entisols are young soils, less developed than inceptisols, with little or no evidence of pedogenic horizon development. In the Plaskett-Keller project area, these soils occupy meadows. Alluvial deposition in these meadows is recent enough that not enough time has passed for soil development to occur.

The dominant soil surface texture is loam in 99% of the treatment areas with at least 15% rock in the surface horizon. Approximately one-fourth of the project area has greater than 35% rock in the surface horizon. Sandy loam textures were noted at several locations during field review but this is within the range of variability for these soil map units. Estimates of soil surface rock cover were made during the field review. About two-thirds of the salvage unit acreage is estimated to have greater than 40% rock cover. Following wildfire, rock cover is very important for the protection of soils from erosion since the other components of soil cover (i.e., the forest floor, woody debris, and low-growing vegetation) are largely gone.

Soils in the project area are mostly shallow to moderately deep. A substantial portion, 20%, of the treatment areas are shallow soils less than 20 inches to bedrock. An additional 72% of the treatment areas are moderately deep soils (20 –36 inches). Soils less than 40 inches deep generally have elevated erosion hazard (unless the bedrock is highly fractured) due to limited capacity for the soil to move water downward and therefore creating higher runoff potential. This higher runoff potential is indicated in the Hydrological Soil Group ratings with “A” being the lowest runoff potential and “D” being the highest. Detailed information on each soils group can be found in table 1 of the Soils Report.

Wildfire Impacts

Soil burn severity in the Plaskett-Keller Project treatment areas was higher than the fire overall (Table 12). The effects on soil in the various burn classes were described previously in the Post-Fire BAER Assessment section. The hydrology section of this document describes soil burn severity in greater detail.

Table 12. Plaskett-Keller Project Soil Burn Severity

Unit Type	Soil Burn Severity (acres)			
	Unburned/Very Low	Low	Moderate	High
Salvage Units	1.4	81.8	715.0	142.5
Roadside Hazard Tree Units	128.3	504.5	563.7	15.6

Water repellency is a phenomenon of some dry soils in which water is very slow to infiltrate into the soil profile. The condition is commonly exacerbated by wildfires and is evaluated as part of the BAER assessment. Within the August Complex Fire BAER assessment, water repellency was estimated to be slight to strong in about 20% of the area that burned at moderate soil burn severity. Repellency diminishes appreciably after the first winter, then returns, but to a lesser degree, when the soil dries again. Repellency gradually diminishes until it is not statistically significant a year post-fire (MacDonald and Huffman 2004). In the Plaskett-Keller Project field assessment, repellency was generally non-existent, with zero to slight repellency in most of the units. Patchy repellency was noted in Units 29, 271 and 272 but would not be expected to affect runoff rates.

Soil cover for erosion prevention is deficient in areas that burned at high and moderate soil burn severity due to consumption of litter and duff, woody material and vegetation. A majority of salvage units have enough rock cover to provide some protection. As a result of this loss of soil cover, some sheet and rill erosion occurred with the rains following the fire, although not extensive. The greatest erosion occurred where both the forest floor and needles on the trees were consumed, and where there is little rock cover. Legacy porosity loss associated with past management is not extensive in most units. Litter and duff, the future nutrient reservoir, is deficient in high and moderate burn severity areas. Soil organic matter is considered sufficient project-wide although diminished near the soil surface where it burned at high soil burn severity. Environmental Consequences

Proposed Action

Ground-based mechanical treatments have the potential to cause detrimental disturbance to soil in the post-fire environment. On-site direct effects from the proposed action are expected to be minimal with the Project Design Features (PDF) including Best Management Practices (BMPs) in place (see Appendix B). The potential for activities to generate additional soil cover in the form of woody debris in areas with moderate and high soil burn severity is considered a net benefit for burned areas, but the loss of vegetation resulting from mechanical operations is a detriment.

Soil erosion and impaired hydrologic function have a general potential to create indirect effects. Indirect effects of erosion and compaction are off-site effects upon watershed hydrology and/or water quality. Damaged soil hydrologic function, via compaction, can lead to increased runoff, which can affect the quantity, timing, and flashiness of stream flows during precipitation events. As discussed, the direct effects associated with proposed activities are expected to be minimal, so indirect effects would be accordingly quite minimal.

The cumulative effects assessment area for the soils resource is bounded in space within the proposed activity area, because this is where the full extent of soil disturbing activities takes place. Effects analysis is bounded in time by past, present, and reasonably foreseeable future actions within that area.

The August Complex Fire caused large scale soil disturbance with consequences to soil productivity. The project has little potential to create impacts of a degree or extent to consider detrimental or adverse to the soil resource. The main potential soil impact is for erosion exceeding the natural rate. However, soil cover in the form of project-generated woody debris and project integrated design features will prevent that from occurring. The proposed action would temporarily remove approximately 2.5 acres of productive soils due to temporary road construction that will be followed up with restoration.

No Action

The No Action alternative would have no effect on the soils, as soil disturbing project activities would not take place. Roadside hazard trees could be felled by hand and left in place. Soil cover for erosion protection would gradually increase as low-growing plants establish and spread. Debris from dead trees would fall and provide some soil cover. Present compaction levels and soil hydrologic function would remain unchanged but slowly remediate naturally. Organic matter dynamics and nutrient cycling would continue to recover naturally, once vegetation becomes re-established and needle cast is complete. Some areas will be left lacking surface cover, while other areas will have high concentrations of fuels for the next fire.

Indirect effects of the No Action alternative would be the continued short-term erosion hazard, particularly for areas with moderate and high soil burn severity as vegetation recovers, needles drop, and woody debris falls to the soil surface. In the long term, areas with moderate and high soil burn severity would have high fuel loadings into the near future, with a corresponding elevated hazard of detrimental soil effects in the event of another wildfire.

Modified Proposed Action

The modified proposed action would remove fewer trees but leave the treatment unit boundaries the same. Effects under this alternative would essentially be the same as Alternative 1 since unit boundaries and activities remain the same. However, there may be less negative impacts (though immeasurable) since less trees would be removed.

4.10. Wildlife

Within the project area there is one Threatened species: northern spotted owl (NSO) and its proposed critical habitat. Forest Service sensitive species that may occur in the area include northern goshawk, bald eagle, pallid bat, Townsend's big-eared bat, pacific marten, fisher, fringed myotis, foothill yellow-legged frog, and western pond turtle.

Forest Service Management Indicator Species (MIS) not listed above that may occur and could be impacted include the acorn woodpecker, pileated woodpecker, western gray squirrel and Douglas tree squirrel.

Migratory bird species that may occur and could be impacted include Lawrence's goldfinch, Nuttall's woodpecker, oak titmouse, olive-sided flycatcher, rufous hummingbird, song sparrow, spotted towhee, wrentit and yellow-billed magpie.

Wildlife Management area affected environment:

Within the wildlife analysis action area there are five management areas: Brushy Mountain, Twin Rocks, Grindstone/ Harvey Springs, Buttermilk and Plaskett Meadows.

The Brushy Mountain management area contains suitable habitat for identified northern spotted owl, bald eagle, fisher, marten, wolverine, fringed myotis, pallid bat, western pond turtle and foothill yellow-legged frog. Potential foraging and nesting habitat for bald eagle is present along Cold Creek. Available habitat for spotted owl and northern goshawk includes dispersal and foraging habitat with minimal nesting and roosting habitat. Spotted owl designated critical habitat is present. Four spotted owl territories from the project action area occur in this management area. FYLF have been detected on the mainstem of Black Butte River. Frogs potentially could utilize reaches of Cold Creek.

The Twin Rocks management area is suitable for northern spotted owl, bald eagle, northern goshawks, fisher, marten, wolverine, fringed myotis, pallid bat, western pond turtle and peregrine falcon. Peregrine falcon have been detected near Telephone Camp, but a nest location is not known. Potential nesting and foraging habitat for bald eagle is present along the Black Butte River. Available habitat for spotted owl and northern goshawk includes foraging, dispersal and nesting roosting habitat. FYLF have been detected on the mainstem of Black Butte River with the potential for frogs to utilize reaches of Atchison Creek, Pinto Creek, Blue Slide, White Hawk Creek and Butte Creek. Western pond turtles have been detected within the project action area along Butte Creek in this management area. Seven known spotted owl territories occur in this management area.

The Grindstone/ Harvey management area contains suitable habitat for northern spotted owl, bald eagle, fisher, marten, wolverine, fringed myotis, pallid bat, western pond turtle, foothill yellow-legged frog and peregrine falcon. Potential foraging for bald eagle is present. No bald eagle nesting habitat is identified because no large bodies of water are present. Available habitat for spotted owl and northern goshawk includes dispersal and foraging habitat with minimal nesting and roosting habitat. Spotted owl designated critical habitat is present. Three known spotted owl territories occur in this management area.

The Buttermilk management area is suitable for northern spotted owl, bald eagle, northern goshawks, fisher, marten, wolverine, fringed myotis, pallid bat, western pond turtle and peregrine falcon. Potential foraging for bald eagle is present. No bald eagle nesting habitat is identified because no large bodies of

water are present. Available habitat for spotted owl and northern goshawk includes dispersal and foraging habitat with minimal nesting and roosting habitat. Spotted owl designated critical habitat is present. Five known spotted owl territories occur in this management area.

The Plaskett Creek management area contains suitable habitat for identified northern spotted owl, bald eagle, fisher, marten, wolverine, fringed myotis, pallid bat, western pond turtle and foothill yellow-legged frog. Potential foraging habitat for bald eagle is present at Plaskett Meadow adjacent to the lakes. Available habitat for spotted owl and northern goshawk includes dispersal and foraging habitat with minimal nesting and roosting habitat. Spotted owl designated critical habitat is present. Four known spotted owl territories occur in this management area.

Northern Spotted Owl *(Strix occidentalis caurina)*

NSO Habitat- Detailed descriptions of NSO habitats, including Post-Fire Foraging, can be found in the Wildlife Biological Assessment.

Nest/Roost/Foraging (NRF) *Habitat* for the northern spotted owl consists of habitat used by owls for nesting, roosting, and foraging. Generally, this habitat is multistoried, 80 years old or older (depending on stand type and structural condition), and has sufficient snags and down wood to provide opportunities for nesting, roosting, and foraging. The canopy cover generally exceeds 60 percent, but canopy cover or age alone does not qualify a stand as NRF.

NRF habitat that burned at low severity is still considered to be functional. Low severity fire may burn or scorch individual or small groups of trees and may result in some loss of the midstory, but the multi-layered, complex forest with high canopy cover is still present. As these fire-affected trees die, they will fall and provide coarse woody debris. NRF habitat will not be treated by this project.

Post-Fire Foraging (PFF) *Habitat* for the northern spotted owl is NRF that has burned at moderate to high intensity and may include occasional individuals or small clumps of green trees but, for the most part, are completely stand-replaced and no longer function as nesting or roosting habitat, nor do they provide enough canopy cover for functional dispersal habitat. However, some studies have shown that spotted owls may continue to utilize this habitat post fire. This is likely incumbent on the patch size of this habitat and its relationship to known owl sites, juxtaposition on the landscape, and other factors. There are differences in the spatial arrangement of spotted owl habitat, locations of activity centers, burn severities and scales of this type of habitat.

For this analysis, the Forest stratified PFF based on factors that influence the likelihood of use by owls. Primary PFF (PFF1) is post-fire foraging habitat within 500 feet of existing NRF having high relative habitat suitability (RHS). PFF1 is more likely to be used by foraging owls than secondary PFF (PFF2), which is more than 500 feet from existing high RHS NRF. This accounts for the degree that the PFF contributes to habitat fitness (survival and reproduction) of NSOs at least in the short-term.

Dispersal Habitat is a subcategory of "all dispersal" habitat for northern spotted owls. All- dispersal is defined as dispersal plus NRF. Throughout this document, "dispersal" will be used to describe dispersal-only habitat. Thomas et al. (1990) defined dispersal habitat as forested habitat more than 40 years old, with canopy closure more than 40 percent, average tree diameter greater than 11 inches, and flying space for owls in the understory. By that definition, dispersal habitat does not provide the components found in NRF. It provides temporary shelter for owls moving through the area between NRF habitats and some opportunity for owls to find prey; but it does not provide all of the requirements to support an owl throughout its life.

Unsuitable habitat does not provide habitat for northern spotted owls and would not develop into NRF or dispersal habitat in the future.

NSO Critical Habitat

Critical habitat for the NSO was originally designated in 1992 (57 FR 10:1796-1837). Critical habitat was revised in 2008 (73 Federal Register 157:47326) and became effective on September 12, 2008. The 2008 USFWS's critical habitat (CH) delineation was challenged in court and the 2008 designation of northern spotted owl CH was remanded and the USFWS was ordered to revise the CHU designation. On February 28, 2012, the Service released the proposed critical habitat in the form of maps and the draft form of the federal register publication. The final rule was published in the Federal Register on December 4, 2012 and became effective January 3, 2013 (77 Federal Register 233:71876-72068).

Section 4(a)(3) of the Act specifies that the Service shall designate critical habitat for endangered or threatened species and may, from time-to-time thereafter as appropriate, revise such designation. Critical habitat is defined as (1) specific areas within the geographical area occupied by the species at the time it is listed, on which are found those physical or biological features that are essential to the conservation of the listed species and which may require special management considerations or protection, and (2) specific areas outside the geographical area occupied by the species at the time it is listed that are essential for the conservation of a listed species. Past regulations emphasize "primary constituent elements," or PCEs, in identifying these physical or biological features. Recent revisions to the regulations rely on the physical or biological features (PBFs) essential to the conservation of the northern spotted owl are forested lands that are used or likely to be used for nesting, roosting, foraging, or dispersing; that are from this time forward are to be used.

Post-Fire Impacts

NSOs exhibit site fidelity and are central-place foragers; they may continue to use the post-fire landscape depending on the remaining post-fire habitat conditions (suitable habitat) in the area (Clark 2007, Clark et al. 2011, Clark et al. 2013, Gaines et al. 1995, King et al. 1998). High-severity burns were generally not used by spotted owls for nesting/roosting (Bond et al. 2009, Clark 2007, Clark et al. 2011, Clark et al. 2013, King et al. 1998) due to live canopy loss. However, northern and California spotted owls have been known to use burned areas for foraging (Bond et al. 2009, Comfort 2013, Eyes 2014, Lee et al. 2012, Lee et al. 2013, Lee and Bond 2015, Hansen and Odion 2016), although the extent of use is unknown (Manley 2014). The results of these studies have been variable. Bond et al. (2009) suggests that California spotted owls preferentially used high-severity burned areas for foraging compared to unburned or low-severity areas, and that salvage logging within 1.5 km (0.9 mi) of an Activity Center (AC) may result in abandonment of the site. However, Comfort (2013) found that northern spotted owls and Eyes (2014) found that California spotted owls avoided high-severity patches and used lower-severity patches for foraging. Eyes (2014) had a similar study to Bond (2009) but with twice the sample size and greater timeframe (3 years versus 1 year).

The studies and research on the use of fire landscapes by the northern spotted owl is highly variable and studies often contradict each other. Studies such as Eyes (2014 and 2017) demonstrate the use of edge habitats for foraging; however, Comfort (2013 and 2016) demonstrate that northern spotted owls avoided these high contrast edges. The potential for NSO to use fire-caused edge effect foraging opportunities around low severity fire and nest/roost locations was considered for this project. This foraging habitat was delineated in order to capture the potential for continued use by NSO of previously suitable NRF that burned at moderate to high severity. Some studies have shown that burned areas can

still function as foraging after a fire, depending on many factors including patch size, edge type, burn severity, and proximity to suitable unburned habitat and known owl sites (Bond et at. 2016, Bond et al. 2002, Bond et al. 2009, Clark 2007, Clark et al. 2011, Clark et al. 2013). The United States Fish and Wildlife Service (USFWS) recognized the importance of designating this habitat type and analyzing the effects from post-fire salvage. Although edge effect foraging lacks key habitat components generally associated with NRF, it has the potential to provide foraging opportunities.

Where suitable NRF habitat is not present, NSO may still venture into moderate to high burn severity areas to forage. In the studies listed above, NSO are likely to forage in burned areas closer to NRF than they are to forage in burned habitat further away from NRF. Therefore, in order to incorporate the information described above on NSO use of edge habitat in post-fire landscapes, the edge effect foraging habitat was further refined. Using ArcGIS, 500-foot and 1000-foot buffers were applied to areas that are currently suitable NRF in moderate and high burn severity (greater than 5 acres). Within that 500-foot buffer (PFF1), any previous NRF habitat that burned at moderate to high severity was identified as the edge foraging habitat. We estimated the most likely maximum distance NSO would forage from the edge of suitable NRF (low fire severity or no fire effects) into suitable burned habitat (moderate or high severity) to be approximately 500 ft. This distance was derived from a combination of reviews of recent literature on the use of edge habitat as described above and in consultation with Level 1 USFWS biologists. ***No fire-created edge foraging opportunities occur in the project action area.***

For the habitat assessment, the 2020 RAVG layer was overlaid with the MNF corporate vegetation layer to calculate the approximate changes in habitat conditions from the wildfires. This document uses Basal Area Loss as Killed (BAK) and measures the percent change in basal area or tree cover (relative number of live trees on the site) from the pre-fire condition to indicate habitat removed, downgraded and degraded for NSO.

Table 13. Post fire outcomes on existing NSO nesting/roosting and foraging habitat.

Fire Intensity Class	**Percent BAK**	**Post-fire Nesting/Roosting**	**Post-fire Foraging**
1	0% - 25%	Degraded but maintained as Nesting/Roosting	Degraded but maintained as Foraging
2	25% - 50%	Degraded but maintained as Nesting/Roosting	Degraded but maintained as Foraging
3	50% - 75%	**Removed to unsuitable**	**Removed to unsuitable**
4	75% - 100%	**Removed to unsuitable**	**Removed to unsuitable**

Table 15 (and supported by Table 13) shows the total acres by fire intensity class within the Action Area as well as the acres by NSO habitat nesting/roosting and foraging habitat (N/R and F) by intensity class.

Table 14. NSO pre and post fire habitat change for the Plaskett-Keller project action area.

Pre-fire Habitat 2018	Post Fire Habitat 2020	Change in habitat acres
Dispersal (D)	Dispersal	2,440 (stayed the same)
Dispersal (D)	Non-suitable	4,343 (removed to unsuitable)
Foraging (F)	Foraging	2,473 (stayed F)
Foraging (F)	Non-suitable	3,887 (removed to unsuitable)
Nesting/Roosting (NR)	Non-suitable	3,572 (removed to unsuitable)
Nesting/Roosting (NR)	Nesting/Roosting	1562 (stayed NR)

Table 15. Total acres of NSO Nest Roost (N/R) and Foraging (F) burned within the Action Area.

Intensity Class	N/R	F
1	1,363 (stayed NR)	2,075 (stayed F)
2	199 (stayed NR)	398 (stayed F)
3	974 (removed to unsuitable)	357 (removed to unsuitable)
4	2,598 (removed to unsuitable)	3,530 (removed to unsuitable)

Post-Fire Impacts on NSO Activity Centers (AC)

Seventeen NSO ACs fall into the 1.3-mile action area of the project units. Each burned, to varying amounts and intensities, during the August Complex fire. Nine ACs (with home ranges and core areas) overlap with salvage and roadside salvage units. Details of each NSO AC and burn intensity can be found in the Plaskett-Keller August Complex Phase 1 Wildlife Biological Assessment and Evaluation.

Overall, there has been a substantial decrease in Nest/Roost/Forage habitat as a direct result of the 2020 August Complex.

NSO surveys and Occurrences

The purpose of this section is to disclose the best available information of observations of this species within the action area. Between 1974 and 2021, various portions of the action area were surveyed for spotted owls. Call stations were established for the 2021 season based on the current post-fire suitable habitat for NSO in the action area. Most recent surveys from 2017 to 2020 covered the Smokey Fuels Treatment project area that overlaps with the Plaskett-Keller project area was surveyed by Tanner Consulting. The analysis of potential effects of the Plaskett-Keller project is dependent on the assumption that owls are still present in the suitable nesting habitat remaining. The Smokey fuels surveys are described in the section below.

There has been a total of 156 known responses and detections of NSO in the project action area from 1974 to 2021. The most recent surveys were completed in 2021 with six complete visits along call stations in the action area. Surveys were completed from May 6 to July 14 by the Grindstone and Upper Lake district biologists and staff to determine if owls have moved out of the project action area to more prevalent habitat within the forest. According to the 2012 protocol, surveys typically begin from March 15 to April 14 (USFWS, 2012). However, due to snowpack creating unavoidable operational condition, call routes were not accessible prior to May, and this was discussed with Fish and Wildlife Service (FWS). Approval was attained and it was determined surveys do meet the protocol standards. Three surveys were completed before June 30. The second year of surveys will be completed in spring/ summer of

2022 depending on snow-pack and project access. If surveys are not able to begin in March or April due to access and snow-pack, the FWS will be alerted.

Listed is Table 16 showing NSO detections in Activity centers where proposed treatments are to occur.

Table 16. Summary of NSO Detections in Activity Centers with Project Treatments

Survey years	Activity Center	Detections	NSO detections	NSO Detections in 2021	Reproduction detected
1974-2021	GLE0001	35	Unknown Singles, Male, Female and Pairs	1 single male (only auditory, no visual)	Yes (1990, 1994, 1998)
1980-2021	GLE0002	26	Unknown Singles, Males, Pair	1 single male (visual of the owl)	Yes (1980, 1990, 1992 and 2008)
1987-2021	GLE0003	24	Males, Females, Pair	None	Yes (1988)
1982-2021	GLE0004	22	Males, Females, Pair	None	Yes (2014)
1982-2021	GLE0011	14	Male, Female, Pair	None	No
1982-2021	GLE0025	2	Males	None	No
1991-2021	GLE0023	9	Uknown Single, Male, Female	None	No
1990-2021	MEN0019	14	Uknown Singles, Females, Males, Pair	None	Yes (2006)
2015-2020	GLE0035	10	Males and Pair	None	No (pair roost detected in 2020, but no known reproduction)

Tables for each AC with NSO detections by survey year are listed in the Wildlife Biological Assessment and Evaluation.

The 2021 surveys in the project covered remaining suitable habitat (over 64% has been burned) with call stations covering areas in each of these nine ACs. Two individual owls were detected in the action area from 2021 surveys. Both of these are likely males with one of them visually detected in the home range of GLE0002. No pairs or nests were detected. 2021 Surveys in AC GLE0002 and MEN0019 did not result in detections of nests.

In general, due to the extent and severity of the fire, it is unlikely that these NSO will nest within ¼ mile of the salvage units; however, with individuals present, nesting cannot be ruled out without another year of surveys and activity center searches. The Forest will conduct 6 site visit surveys in 2022 to complete the 2-year survey protocol and ensure nesting is not occurring in the action area.

If the 2-year surveys are not completed, an LOP from February 1 through July 31 will be imposed. The proposed treatments will occur in moderate to high severity areas; therefore, surveys will only be

needed to prevent disturbance. If owls are found to be nesting within ¼ mile of any unit, no noise- or smoke-generating activities will occur between February 1 and July 31.

Table 17. Barred owl detections in Activity Centers with project treatments.

Detections Date range	Activity Center	Detections	Barred Owl detections	Reproduction detected
2020	GLE0023	2	Single males	No

Activity Center GLE0023 was surveyed as far back as 1991 and as recently as 2021. A single NSO was detected in 1991, but no nest or reproduction was detected. No NSO detections occurred in 2021. In 2020, Tanner Consulting detected 2 male barred owls in GLE0023 (Table 17). These barred owls were not detected in 2021. However, with known recent barred owls' presence, the presence of NSO in this AC is unlikely as they would be outcompeted. Future surveys in this AC are expected to be conducted to determine presence or absence of NSO and barred owls.

NSO surveys and occurrences in adjacent projects that overlap

The Plaskett-Keller project is located directly adjacent to previous Smokey and Hardin timber projects. NSO protocol level surveys were conducted for Smokey and Hardin from 2010 to 2020. Surveys were contracted out and conducted by the Tanner Consulting firm for the last five field seasons.

Table 18. Summary of NSO Detections in the Smokey and Hardin Fuels Projects that overlap with the Plaskett-Keller footprint.

Survey Years	Activity Center	Detections	NSO detections	NSO detections 2020	Reproduction detected
1974-2021	GLE0001	35	Singles and pairs	None	Yes (1990 and 1994)
1980-2021	GLE0003	26	Singles and pairs	Single male	Yes (1980, 19990, 1992, 2008)
1982-2021	GLE0004	22	Singles	Single male	Yes (2014)
1980-2021	GLE0011	14	Singles	Single female	No
1991-2021	GLE0023	9	Singles	None (only barred owls)	No
2015-2020	GLE0035	10	Singles and pairs	Roosting pair (no nest found)	No

The most recent surveys from 2020 detected a roosting pair in AC GLE0035, a single male in GLE0004, a single female in GLE0011 and a single male in GLE0003. Two male barred owls were detected in AC GLE0023. Not surprisingly, no NSO were detected in GLE0023 with the presence of barred owls.

4.10.1. Environmental Consequences

Proposed Action

Direct and Indirect Effects

The project treatments will affect 6% of the high severity fire areas of the previously suitable N/R habitat, 14% of the high severity fire areas of the previously suitable foraging habitat and 11 % of the high severity fire area of the previously dispersal habitat within the Action Area (AA), 29,389 acres. The

project action area has a total of 17, 091 acres high burn severity acres . The project will treat 12% of the total acres of high severity burned areas within the AA.

The project area will not remove or downgrade any of currently suitable N/R habitat. A total of 0.8 acres of currently suitable Foraging habitat, and 0.42 acres of currently suitable Dispersal habitat could be removed or downgraded. The project will remove 0% of currently suitable N/R habitat, 0.03% of currently suitable Foraging habitat, and 0.02% of currently suitable Dispersal habitat in the action area. A total of 233 acres of Post Fire Foraging habitat would be removed by commercial, roadside salvage and fuels treatments. Removal of any suitable habitat and PFF is defined as an adverse effect; however, given such a minimal amount of habitat being affected, impacts are not expected to significant to habitat.

Due to an adverse effect determination, an incidental take statement is expected to be issued from FWS. There is potential for take where removal of suitable habitat would occur at Plaskett Meadow Campground. However, it is very unlikely owls would be nesting, roosting or perched in this area due to lack of optimal nesting habitat in the campground and the general noise disturbance from recreation. Direct injury or take from habitat removal is not expected to occur.

Suitable Habitat

The Plaskett-Keller project will treat approximately 944 acres of commercial, ground-based timber harvest of fire-killed trees (defined with different mortality probabilities based on units) and 1,220 acres of roadside commercial and fuels treatment of hazard trees. Hazard tree removal would be defined by 50 to 100% mortality classes in accordance with the #RO-11-01 for "Marking Guidelines for Fire-Injured Trees in California" (Smith and Cluck 2011). For analysis purposes for the effects of NSO, a 200ft roadside buffer (400 feet maximum totaling 1,220 acres) was used.

Commercial treatments and roadside salvages actions will be followed by hazardous fuels reduction treatments. Fuels treatments would include mechanical thinning, piling, handing, understory burning and pile burning. These activities would be performed within salvage and roadside hazard units and will help alleviate fuels buildup from any logging slash. Fuel accumulation should be reduced to no more than 10 tons/acre by removing merchantable timber and biomass and by burning slash piles. Fuels treatments are designed to further protect resource values by contributing to fire resiliency for adjacent remaining habitat within the Action Area. Fuels reduction treatments will reduce fuel loading, that if left on the landscape, could result in future high-severity fire which may damage post-fire recovery efforts in an already fire damaged watershed.

There are seventeen ACs impacted by the project with commercial and roadside salvage and fuels treatment occurring in nine. The lowest impacted AC was Kill Dry with a total of 8.39 acres in the home range impacted. That impact to Kill Dry is on the very outrange of the 1.3-mile territory with only 1.8% of high severity burn area treated which is a very insignificant impact. The highest impacted ACs are Pinto Creek, Keller Lake and Butte Creek with the most treated acres. However, Keller Lake and Butte Creek Activity Centers almost completely overlap with one another, indicating some treatments would affect both ACs simultaneously. However, all three of these ACs have the most habitat loss from the fire. Nesting and roosting habitat has greatly diminished, and new nest are not expected to occur in these ACs. The highest percentage of burned area treated in any of the seventeen affected ACs 1.3-mile home range is 75% (Keller Lake AC – Table 24). This is the percent to be treated, it does not mean 75%

of the habitat would be removed here. Suitable habitat in this Keller Lake AC would not be removed or downgraded as on 100% probability of mortality trees would be targeted for units overlapping.

This will leave a minimum of 25% of the high severity burned area untreated in the Keller Lake AC 0.7-mile core area, in addition to the acres of untreated very low, low, and moderate intensity burned areas and untreated currently suitable Nest/Roost (N/R) (NSO will also foraging in N/R habitat) and foraging habitat.

The areas to be treated will be a varied basal mortality based on units and scale of hazards to public safety. Clark (2007), Comfort (2013), and Eyes (2014) found that spotted owls foraging predominantly in low severity burned areas, which are not being treated. However, if NSO use high severity burned areas, potential foraging function will be maintained in all treatment areas by the retention of NSO hunting perches and prey species habitat. Post Fire Foraging (PFF) habitat in areas within 500 feet of suitable Nest/Roost/Foraging fall into commercial and roadside salvage units. PFF impacts are described in the section below.

Salvage operations in general will remove fire damaged firs, but will look retain all pine and hardwoods in the stand unless they pose a safety hazard to operators. Table 19 through Table 23 below displays the acres of Nest/Roost/Forage (NRF) habitat affected by the proposed activities and the change in quantity or quality of the habitat affected of suitable habitat.

Post Fire foraging habitat

While not currently meeting the definition of foraging habitat, as stated above spotted owls have been found to use burned areas for foraging. Research has found that spotted owls may use high severity areas for foraging. To maintain potential NSO foraging options in these burned areas, a minimum of 4 snags and 4 logs per acre will be maintained (LRMP 1995). In addition to any green tree or trees with any green still on them, the trees/snags to be maintained are fire-killed predominant trees, fire-killed trees with deformities, and pre-fire snags that don't cause a safety hazard. Existing pre-fire logs and cull (unmerchantable portions) logs will also be left on site. It is expected that the number of trees/snags and logs left will exceed 4 snags and 4 logs per acre. NSO are "perch and pounce" predators and the leave trees will provide adequate perches from which to hunt.

No currently suitable (green and unburned) N/R habitat is being treated (as only dead trees or dying trees are being taken); however, NSO have been known to forage in burned areas adjacent to any remaining green areas. Some foraging habitat is proposed to be treated in units where less than 100% basal mortality is to occur in units where hazard trees present a safety issue to the public. In areas where sufficient NRF habitat is not available, NSO have been known to venture into moderate to high burn severities to forage.

In the studies listed above, NSO are likely to forage in these burned areas closer to NRF than they are to forage in burned habitat further away from NRF. Therefore, in order to incorporate the information described above on NSO use of edge habitat in post fire landscapes, the edge effect foraging habitat was further refined. Using GIS, a 500-foot buffer was applied to areas that are currently suitable NRF (greater than 5 acres). Within that 500-foot buffer, any previous NRF habitat that burned moderate to high severity was identified as the edge foraging habitat. We estimated the most likely maximum distance NSO would forage from the edge of suitable NRF (Low fire severity or no fire effects) into suitable burned habitat burned at moderate or high severity to be approximately 500ft. This distance was

derived from a combination of reviews of recent literature on the use of edge habitat as described above and consultation with level 1 USFWS biologists. Fire created edge foraging (PFF) habitat overlaps with both commercial salvage and roadside salvage units.

Within the Action Area, a total of 5,186 acres of PFF occur. Of that 5,186 acres of PFF, 233 acres is proposed to be treated with 109 acres within roadside and 124 acres within commercial salvage units. This former habitat (Post-Fire Foraging or PFF), if located near areas with remaining green NRF habitat, has been shown to be used by foraging owls. PFF does not meet the USFWS definition of unburned NRF habitat, but research demonstrates that NSO do use these areas (Comfort et al. 2016, Lee and Bond 2015, Eyes 2014, Clark et al. 2013, Comfort 2013, Irwin et al. 2012, Jones et al. 2016, Jones et al. 2020, Lee et al. 2012, Bond et al. 2009, Center for Biological Diversity et al. v. Susan Skalki and United States Forest Service [Manley Declaration] 2014). For this reason, some authors have suggested formerly suitable habitat should be considered, post fire, as suitable habitat for NSO (Bond et al. 2016).

The extent to which NSO use fire-killed snags in these areas as foraging perch sites, vs. perching in adjacent areas with good vegetative cover while seeking prey in the PFF areas, is unknown. However, it is reasonable to conclude that removing snags in PFF habitats may decrease use of these areas by foraging owls. Snags will be retained consistent with the recommendations in the Forest Wide Late Successional Reserve Assessment, Forest Plan Standards and Guidelines, and the project's design criteria. Effects of removing snags from PFF habitat are likely to be minimal for multiple reasons. Intact post-fire suitable nesting, roosting, and foraging habitat is available for foraging opportunities and provides the majority of the foraging areas available in the analysis area and across the forest landscape.

The majority of the available PFF in the Action Area (approximately 96%) is not proposed for treatment. During field visits to the project area, it was noted that areas that burned at high severity that were bordered by areas of low severity burn typically had a transition zone of mixed fire severity that contains a mix of live and dead trees. By focusing treatments within areas devoid of live trees the "diffuse edge" areas that burned with mixed severity, and consequently have live and dead trees intermixed, are maintained. These areas of PFF with diffuse edge have been shown to be preferred by foraging owls. Removal of any trees within this PFF is defined as an adverse effect, however, based on an abundance of PFF remaining in the action area and forest landscape impacts are not expected to be significant. Removal of PFF habitat is not expected to lead to a detrimental decline in habitat. Nesting has not known to occur in PFF based on literature, but owls have been known to forage in these areas.

Effects to suitable habitat outside of ACs

Because Unit 310 is treated at 50% probability of mortality, habitat will be removed. Unit 310 has **0.8** acres of foraging habitat that will be removed/ downgraded. Unit 310 has **0.42** acres of dispersal habitat will be removed.

Below are two tables (Table 19 and Table 20) showing suitable habitat outside of ACs and NSO CH.

Table 19. Treatment in NSO suitable habitat outside of ACs - roadside and commercial salvage units.

Treatment unit	Probability of Mortality (%) to be removed	NR Acres treated	Foraging Acres treated	Dispersal Acres treated
33	90%	0	0.002	0.36
311	90%	0	5.4	1.3
310	50%	0	**0.8**	**0.42**
29	90%	0	0	0.35
270	90%	0	7.95	7.04
272	100%	0	0	0.13
271	90%	0	1.6	1.64
13	90%	0	9.1	0.3
Roadside	70-100%			
Total		**0**	**24.8 (0.79 removed)**	**11.54 (1.3 removed)**

Table 20. Treatment in NSO suitable habitat outside of ACs roadside fuels treatments.

Treatment unit	Probability of Mortality (%) to be removed	NR Acres	Foraging Acres treated	Dispersal Acres treated
Roadside/ fuels	70-100%	2	6	22
Total		**2 (0 removed)**	**6 (0 removed)**	**22 (removed)**

The proposed treatments have the potential remove/downgrade **0.8** foraging acres and **0.42** dispersal acres, a total of **1.22** acres outside of the ACs. No nesting/ roosting habitat will be removed or downgraded. There are a total of **6,674** acres of suitable habitat in the 1.3-mile project action area. There is only a **0.01%** of potential habitat removal or downgrade. In comparison to the action area and the large landscape of the forest, this is extremely minimal. ***However, even with such a minimal acres impacted, this is still considered an adverse impact due to the potential removal of suitable habitat*.**

Summary of Acres of impacts to NSO (including ACs)

Table 21. Total acres of NSO from Salvage treatments in roadside and commercial units.

Habitat	Pre-Treatment Acres (Commercial Salvage)		Post-treatment Acres (Salvage)	
	Project Area Units	**Action Area (1.3-mile buffer surrounding the project area)**	**Project Area Units**	**Action Area (1.3-mile buffer surrounding the project area)**
N/R	1.9	1,562	1.9	1562
F	64	2,473	63.2 (0.8 removed)	2,472.2
D	44	2,440	43.6 (0.42 removed)	2,439.6
PFF	124	5,186	124	4,964

For commercial roadside and salvage units and fuels treatments, a total of **0.8** acres of foraging habitat and **0.42** acres of dispersal habitat would be removed or downgraded because removal of 50-100% probability of mortality of trees would occur.

Table 22. Total acres of NSO habitat from roadside Fuels treatments.

Habitat	Pre-treatment acres Roadside Fuels Treatments		Post-treatment Roadside Fuels Treatments	
	Project Area Units	Action Area (1.3-mile buffer surrounding the project area)	Project Area Units	Action Area (1.3-mile buffer surrounding the project area)
N/R	4.7	1562	4.7	1562
F	32	2,473	32	2,473
D	91	2,440	91	2,440
PFF	109	5,186	109	5,080

For roadside fuels treatments no suitable NSO habitat would be removed or downgraded. Habitat would be modified, but maintained because all of these treatments would only remove trees from 70-100% probability of mortality.

Table 23. NSO Suitable Habitat Effects from the Plaskett-Keller project action area.

	N/R	F	Dispersal	PFF	Total
Acres of habitat type affected by Activities	6.6	96	135	233	**470.6**
Habitat Modified and Maintained	6.6	95.2	134.6	0	**230**
Habitat downgraded/removed	0	0.8	0.42	233	**240.8**

Of the nine ACs that have proposed treatments, no ACs would have NSO suitable habitat removed. All of the ACs with proposed commercial and fuels treatments would only have trees at 70-100% probability of mortality removed. A total of 3.1 acres of NR, 130 acres of foraging and 147 acres of dispersal habitat in these ACs would be treated, but not removed or downgraded. Trees removed at those probability mortalities would not remove or downgrade habitat, but modify and maintain suitable habitat. This is only a very minimal acreage over the span of all the activity centers and the entire action area. A total of **168** acres of PFF would be treated within six of the nine ACs analyzed here.

There is a total of **6,123** acres of NSO post-fire suitable habitat total in all nine of these ACs. There is 0% of potential habitat removal or downgrade.

Table 24. Total acres treated by NSO territory in the action area.

AC #	AC Name	Post-fire, **untreated** N/R and F habitat within the NSO territories				**Total Acres Treated within 0.7 miles**	**Acres of high severity (75% or higher) burn treated within 0.7**	**Acres of high severity burn within 0.7 mi**	**% high severity acres treated within 0.7 mi**	**Total Acres Treated within 1.3 miles**	**Acres of high severity burn treated within 1.3 miles**	**Acres of high severity burn within 1.3 mi**	**% high severity burn treated within 1.3 miles**
		N/R habitat within 0.7miles of AC	F habitat within 0.7 miles of AC	N/R habitat within 1.3 miles of AC	F habitat within 1.3 miles of AC								
6048	Pinto Creek	24	12.9	29	118	**216.5**	196.4	790	25%	**519.27**	417.9	2,578	16%
6037	Keller Lake	9.37	36.2	11.6	127.8	**381.46**	312.7	820	38%	**777.61**	612.3	820.3	**75%**
6082	Butte Creek	6.6	39.4	13.9	107.4	**246**	187.5	801.6	23%	**756.13**	616.1	2666.6	23%
3024	Cold Creek	6.1	94	25.6	474.2	**0.71**	0.51	82	0.6%	**315.91**	157.4	1558.5	10%
3005	Shepherd Ridge	113	76.5	255	255	**69.7**	4.2	220.5	2%	**165.59**	12.6	1041.5	1.2%
3006	Kill Dry	287	96.3	499	310	**0**	0	8.8	0%	**8.39**	2.5	135	1.8%
3007	East Kill Dry	0	0	2.5	100	**0**	0	0	0%	**0**	0	229.7	0%
3025	Brushy Mountain	0	0	0	0.9	**0**	0	31.5	0%	**0**	0	348.5	0%
3034	Barb Ridge	87	54.6	196	32.3	**0**	0	0	0%	**0**	0	83.8	0%
6057	Mcoy Ridge	0	0	0	0	**0**	0	0	0%	**0**	0	109.6	0%
6085	O' Neil Creek	0.3	7.4	0	12.5	**0**	0	152.6	0%	**0**	0	1039.7	0%
3048	Harvey Spring Ridge	112	238	249	794	**0**	0	32	0%	**23.15**	1.92	358	0.5%
3009	South Branch	52	105	63	56	**0**	0	578.8	0%	**58.73**	30.9	1556.9	1.9%

	Board Creek												
6056	Billy Pike Ridge	0	0	58	7	**0**	0	0	0%	**0**	0	289.8	0%
3008	Shepherd Ridge	0	7.1	35	5.7	**0**	0	0	0%	**0**	0	10.6	0%
1049	Board Creek	0	0	56	3.5	**0**	0	0	0%	**0**	0	437.6	0%
3062	GLE0035	19	31	104	94.5	**0**	0	829	0%	**112.3**	68.9	2,105	5.3

Snags and Down Woody Debris

The removal of dead/dying trees and down woody material through salvage harvest reduces fuel loading, and the reduction in fuel loading may promote the development of old forest habitat by reducing the risk of catastrophic wildfire. However, the effectiveness of proposed salvage (and fuels) treatments is difficult to predict and there is considerable uncertainty with how salvage logging influences future fire. It is known that salvage harvest reduces fuel loading over time (i.e. as snags fall, large surface fuel loadings result) and reduced surface fuel loads may reduce soil and forest regrowth damage in a re-burn and help prevent the spread of the fire into adjacent habitat (Peterson 2014).

Considering stand conditions following fire, all snag requirements would be met through retention of remaining pre-existing snags, as well as pine, non-merchantable firs, and hardwoods trees that died during or after the fire. Creation of additional snags is unlikely to be necessary. The operator would ensure that a minimum of four large snags per acre (generally greater than 20" DBH), averaged over 40 acres, is retained. Averaging allows for creating large snag clumps and compensates for the areas that lack large diameter snags/trees.

Because of such high fire severity, the area lacks organic matter and in particular coarse woody debris on the ground. The operator would retain or create a minimum of four sound logs (decay class 1 or 2) per acre. Preference would be given to logs greater than 20" in diameter at the larger end and greater than 10 feet in length. The operator would also retain all existing large rotten logs (> 20" in diameter at the large end; decay class 3, 4, and 5) unless they contribute to hazardous fuels levels. When operationally feasible, operators would follow recommendations of District/Forest hydrologist and place logs parallel with the contour.

Disturbance

No treatments will occur within ¼ mile of Nesting/ Roosting Habitat or within ¼ mile of valid ACs until either the 2-year protocol level surveys are completed or outside of LOPs (February 1 through July 31) to account for any potential breeding NSO. Where hazard tree removal occurs within an AC, a LOP of February 1 and July 31 will occur or, if surveys determine no occupancy, the LOP could be lifted sooner. There are ten known units within a ¼ mile of suitable Nesting Roosting habitat and no actions will occur in these units between February 1 and July 31.

Landings and Temp Roads

An estimated 2.5 miles of temporary roads may be needed for the proposed salvage treatments Salvage operations have the potential to increase levels of vehicle traffic in the area. A subsequent increase in the amount of traffic on Forest System roads is anticipated across the project area. Higher than normal levels of traffic and the associated noise has the potential to disrupt the normal behaviors of wildlife, including NSO, in the action area.

Potential landings have been identified and are estimated at 22.6 total acres within the action area. In general, for every 100 acres of treatment area, it is estimated 4-8 acres of landing area would be required for decking. Existing landings, roadside turnouts and natural openings would be used to the extent they are safe and feasible. The majority of additional ground landings would be located within the roadbed; however, some limited expansion may be needed.

A total of 118 existing landings would be made available to expedite operations; no new landings are expected. If new landings are required, consultation would need to occur with the district biologist to ensure no landings would occur in any NSO suitable habitat. Existing landings would be located either within or adjacent to roadside or commercial salvage treatment units.

LOPs would also apply to use of landings and temporary roads to minimize any breeding disturbance. Any use of landings or temporary roads has the potential for noise disturbance of individual owls resulting in short-term displacement if perched nearby.

Where roads occur near or adjacent to areas used by NSO, there is also an increased chance for a vehicle to collide with an NSO (logging truck, heavy equipment transport, water tenders, personnel vehicles, etc.) likely resulting in mortality. The chance of this occurring is somewhat reduced, though not eliminated, by the generally nocturnal behavior of NSO and the typically diurnal nature of project implementation.

NSO Prey Effects

The proposed project treatments have the potential to have localized effects to prey species in the action area via removal of large woody debris resulting in a loss of connectivity and cover once provided. Salvage harvest targets standing fire-killed Douglas-fir trees that would have provided future potential large woody debris, although areas outside the salvage harvest areas will have abundant large woody debris. Areas that sustained high severity fire provide more open conditions, which can help accelerate the development of the brush and hardwood understory and thus provide better forage and cover for prey species. Shrubs will quickly re-sprout (likely the following spring), providing forage and habitat.

For a full analysis of the prey effect refer to the wildlife biological assessment and evaluation.

NSO Critical Habitat

In the 2012 Critical Habitat (CH) Rule the USFWS identified the physical or biological features essential to the conservation of the northern spotted owl, focusing on the primary constituent elements (PCE). PCEs are those specific elements (refer to Biological Assessment 2021, page 38) of the physical or biological features (PBFs) that provide for a species life-history processes and are essential to the conservation of the species. For the NSO, the PCEs are the specific characteristics that make areas suitable for nesting, roosting, foraging, and dispersal habitat. All PBFs for NSO CH must occur in conjunction with PBF1-Forested types in early-, mid-, or late-seral stages and that support the northern spotted owl.

The Mendocino LRMP (1995) and the USFWS (2009) defines Nesting/Roosting habitat as having a minimum of 60% canopy cover. As recommended by the 2011 Revised Recovery Plan for the Northern Spotted Owl and 2012 CH Rule, the USFWS and Forest Service biologists used local knowledge of NSO habitat use to develop the definitions of foraging and dispersal habitat. The minimum required percent canopy cover for both Foraging and Dispersal habitat is 40%.

Approximately **624** acres proposed for treatment occur in two NSO Critical Habitat Units, Interior California Coast (ICC) units 3 and 4. There are a total of 6,783 acres of proposed CH in ICC3 with 1,205 acres of NR habitat, 469 acres of Dispersal habitat and 1,208 acres of Foraging habitat. There are a total of 4,367 acres of proposed CH in ICC4 with 53 acres of NR habitat, 582 acres of Foraging habitat and 1,066 acres of Dispersal habitat.

For a full analysis of the critical habitat and Physiological and Biological Features, refer to the wildlife biological assessment and evaluation.

Table 25. Total acres of NSO from Salvage treatments in roadside and commercial units in Critical Habitat.

Habitat	Pre-Treatment Acres (Salvage and Roadside)		Post-treatment Acres (Salvage and Roadside)	
	Physical or Biological Features (PBF) acres in project units	**PBF Critical Habitat (CH) acres in Action Area (1.3-mile buffer surrounding the project area)**	**PBF CH acres treated**	**PBF CH Acres in Action area**
N/R	0	1,259	0	1,259
F	1	1,738	1 (modified)	1,738
D	1.16	954	1.16 (modified)	954
PFF	8.7	185	8.7 (removed)	**176.3**

A total of **1.16** Dispersal habitat and **1** acres of Foraging habitat would be modified and maintained because only trees with 70-100% probability of mortality would be removed along roadsides for salvage. No Nesting/ Roosting habitat would be treated in critical habitat. A total of **8.7** acres of PFF habitat would be treated and removed from commercial units/ fuels and roadside salvage.

Table 26.Total acres of NSO from Roadside fuels treatments.

Habitat	Pre-Treatment Acres (Roadside fuels)		Post-treatment Acres (Roadside fuels)	
	Physical or Biological Features (PBF) acres in project units	**PBF Critical Habitat (CH) Acres in Action area**	**PBF CH acres treated**	**PBF CH Acres in Action area**
N/R	0.8	1,259	0.8 (modified)	1,259
F	7.3	1,738	7.3 (modified)	1,738
D	15	954	15 (modified)	954
PFF	3	185	3 (removed)	**182**

A total of **8.1** acres of NRF habitat and **15** acres of Dispersal habitat would be modified and maintained because only trees with 70-100% probability of mortality would be removed along roadsides for fuel treatments. A total of **3** acres of PFF habitat would be treated and removed from roadside fuels work.

Table 27. NSO CH Effects from the Plaskett-Keller project.

	N/R	F	Dispersal	PFF	Total
Acres of habitat type affected by Activities	0.8	8.3	16.16	11.7	**37.4**
Habitat Maintained	0.8	8.3	16.16	0	**25.7**
Habitat Downgraded/ removed	0	0	0	11.7	**11.7**

The project *may affect, but is not likely to adversely affect* (MANLAA) the NSO designated critical habitat due to: **1)** project actions would not remove or downgrade any PBFs in critical habitat; **2)** PBFs are only located in salvage and roadside units where trees with 70-100% probability of mortality would be removed; **3)** the maintenance of snags and downed logs within the treatment units would provide potential foraging roosts and prey species habitat if NSO do forage in high severity burned areas; **4)**

0.22% of Post Fire Foraging habitat would be treated out of the action area; **5)** 27% of the action area is lower severity burned area would be left untreated ; **6)** the high amount of burned, untreated suitable NRF habitat would be available for foraging in home ranges within the northeastern and southern portion of the action area.

Summary of Effects

Continued management in the project area should not affect population levels for the northern spotted owl across its range. This Black Butte River Watershed would continue to provide late successional habitat after implementation of this project since any remaining late successional habitat would be excluded from the proposed salvage and fuels treatments.

Although a total of **2,164** commercial salvage and fuels acres would be treated, only **1.22** acres of Foraging and Dispersal habitat on Matrix lands would be removed or downgraded. These acres occur in a small patch in the action area located at Plaskett Meadow Campground area. A total of 354 acres of suitable habitat would be treated in activity centers (including home ranges); however, these acres would not be removed or downgraded. All 354 acres are in units where only trees with 70-100% probability of mortality trees would be removed. Although this habitat would be modified, it would still be maintained. The effects of noise disturbance, smoke and disturbance in general in the action area would be reduced or negated through LOPs. However, removal of suitable habitat, even being so minimal (1.22 acres), is an adverse effect by definition. Even with an adverse effect, removal of such minimal habitat would not be detrimental to long-term loss of suitable habitat and prey habitat across the action area and forest landscape.

A total of **233** acres of Post Fire Foraging habitat would be treated and removed, which also contributes to the determination of a "*may affect and likely to adversely affect*" the northern spotted owl. An adverse effect determination was made; however, the project is not realistically expected to be detrimental to NSO as late seral habitat and remaining high quality nesting habitat would not be removed. Based on design criteria and mitigations in place to reduce all potential impacts, incidental take of any owl individuals is not expected.

Cumulative Effects of Federal Actions for NSO

The cumulative effects for the action area are comprised of mostly of Federal lands with a mix of private land. A few parcels of private ownership are adjacent to the project treatment units to the north and west. Federal lands administrated by the Mendocino National Forest make up 28,101acres (about 96% of the action area) and private land makes up 1,288 acres (about 4% of the action area). As of November 10, 2021, there are no records in California Natural Diversity Database (CNDDB) of Timber Harvest Plans (THPs) or Non-Industrial Timber Management Plans (NTMPs) in action area. However, given past observations of post-fire actions on private lands, it is reasonable to assume that salvage harvest plans for private land could be filed at any time. Given the past patterns of salvage harvest on private land and to account for these affects in this analysis, we assumed that all private land in the action area that was affected by the August Complex fire, regardless of ownership, will be salvage harvested. Plaskett-Keller project treatments (2,164 acres), combined with the treatments accomplished and yet to be accomplished in the Smokey and Hardin fuels Projects (1,175 acres), Snow Basin (231 acres -already completed), Cold Springs (225 acres) and Powell Salvage projects (246 acres) would involve 25% of the

total Action Area. The 246 acres proposed to be treated for the Powell salvage does not overlap with the Plaskett-Keller action area, therefore is not included in the cumulative treatment acres in table 28.

A total of **1.22** acres of suitable Foraging and Dispersal habitat would be temporarily downgraded under the Plasket-Keller August Complex Phase 1. Although some Foraging and Dispersal habitat would be removed or downgraded, the units are small and only in one area at the Plaskett Meadows Campground. No suitable habitat within the 17 activity centers in the action area would be removed or downgraded by salvage or fuels treatments. It is anticipated that implementation of the Plaskett-Keller treatments in the action area, in combination with these past, present, and reasonably foreseeable future actions, would adversely affect spotted owls. It was determined to be an adverse effect only by definition. Removal of any suitable habitat, no matter how minimal, is considered an adverse effect. Realistically, impacts to habitat would not be detrimental in the long –term, and incidental take/ kill of individual owls is highly unlikely given the project design features. Although some habitat would be temporarily downgraded within these projects, the amount is approximately 0.5% of the total habitat available within the Action Area. The effects of noise or smoke disturbance toward breeding would be reduced or negated through LOPs. Both core and home range area functionality of activity centers would not be reduced.

Table 28 through Table 31 show past, present and proposed federal actions that would occur in the Plaskett-Keller project action area.

For the summary of cumulative effects involving non-federal actions, see the wildlife biological assessment and evaluation.

Table 28. Total cumulative treatment acres (proposed or partially completed) for all projects within the Plaskett-Keller Project Action Area (AA).

Treatment	Smokey/ Hardin	% of AA	Snow Basin	% of AA	Cold Springs/ Powell	% of AA	Plaskett-Keller	% of AA	Total **(acres)**	% of AA
Timber harvest, thinning/ fuels	2,856	9.7%	231	0.8%	0	0	0	0	3,575	11.8%
Commercial/fuels Salvage/ Roadside	486*	1.6%	0	0	225	0.7%	2,164	7%	2,389	7.7%
Habitat Enhancement/ replanting	1,678	6%	0	0	NA	0	0	0	1,678	6%
Total	**5,022**	**17.3%**	**231**	**0.8%**	**225**	**2%**	**2,164**	**7%**	**7,642**	**27.1%**

***The 486 acres of mastication for the Smokey project have not been completed. Mastication is proposed to occur in 2022 and beyond.*

Table 29. Total cumulative acres for all suitable nesting habitat treated or proposed in the Plaskett-Keller Project Action Area (AA).

Treatment	Total in AA	Smokey/ Hardin	% of suitable	Snow Basin	% of suitable	Cold Springs/ Powell	% of suitable	Plaskett-Keller	% of suitable	Total **(acres)**	% of suitable
Nesting	1,562	432* (5.9 mastication units)	27%	0	0	0	0%	6.6 (none removed)	0.02%	438.6	28%

**The Smokey and Hardin fuels commercial components are no longer proposed to be completed. However, a total of 5.9 acres of NR habitat would be treated for mastication in Smokey units in the near future. The Snow Basin project has already been completed. A total of 12.5 acres of NR habitat would be treated from the Plaskett-Keller, Cold Springs/ Powell and Smokey projects in 2022 and beyond.*

Table 30. Total cumulative acres for all suitable foraging habitat treated in the Plaskett-Keller Project Action Area (AA).

Treatment	Total in AA	Smokey/ Hardin	% of suitable	Snow Basin	% of suitable	Cold Springs/ Powell	% of suitable	Plaskett-Keller	% of suitable	Total **(acres)**	% of suitable
Foraging	2,473	608* (31.5 mastication units)	24%	77	3%	0	0%	96 (only 0.8 removed)	4%	781	31%

**The Smokey and Hardin fuels commercial components are no longer proposed to be completed. However, a total of 31.5 acres of Foraging habitat would be treated for mastication in Smokey units in the near future. The Snow Basin project has already been completed. A total of 127.5 acres of habitat would be treated from the Plaskett-Keller, Cold Springs/ Powell and Smokey projects in 2022 and beyond.*

Table 31. Total cumulative acres for all suitable habitat (NRF and dispersal) treated within the Action Area (AA).

Treatment	Total in AA	Smokey/ Hardin	% of suitable	Snow basin	% of suitable	Cold Springs/ Powell	% of suitable	Plaskett-Keller	% of suitable	Total **(acres)**	% of suitable
Total	6,475	1,034* (47 mastication units)	16%	77	1.1%	9.31	0.1%	470.6	1.6%	1591	24%

**The Smokey and Hardin fuels commercial components are no longer proposed to be completed. However, a total of 47 acres of NRF and Dispersal habitat would be treated for mastication in Smokey units in the near future. The Snow Basin project has already been completed. A total of 527 acres of habitat would be treated from the Plaskett-Keller, Cold Springs/ Powell and Smokey projects in 2022 and beyond.*

Continued management in the areas listed above combined with Plaskett-Keller treatments should not be detrimental to population levels for the spotted owl across its range and the forest even with current impacts from wildfire. The Black Butte River watershed would continue to provide for late successional dependent species after implementation of this project as no late successional habitat would be treated.

Although a total of 2,164 acres would be treated, only 0.8 acres of Foraging habitat and 0.42 acres of Dispersal habitat on Matrix lands would be removed or downgraded. These acres occur in only in the Action Area (Plaskett Meadows Campground). The effects of noise disturbance in all projects would be reduced or negated through LOPs.

Determinations of Effects

Northern Spotted Owl

The proposed activities ***may affect and is likely to adversely affect*** the northern spotted owl for the following reasons:

- Of the seventeen active owl territories in the action area, nine would be treated;
- Noise and smoke disturbance potentially could be produced by large landscape fuels and salvage treatments within the project area;
- Foraging and Dispersal habitat are located in treatment units where trees with less than 100% probability of mortality would be removed, which results in a potential for modification or removal of suitable NSO habitat;
- Removal of any suitable habitat by definition is an adverse effect to NSO;
- Remaining areas of unburned vegetation and other residual legacy elements would be protected to serve as remnant wildlife structure as the area transitions through seral stages.
- The snag and coarse woody debris retention guidelines from the LRMP would provide for potential foraging perches and prey habitat if NSO are using the area to forage.
- LOPs would protect any remaining Nesting/ Roosting habitat and valid activity centers from all disturbance and work activity.
- Openings created by salvage operations would increase shrub habitat used by NSO prey such as woodrats, mice, and voles.
- Salvage harvesting would reduce fuel loads and potentially reduce the risk of future catastrophic wildfire in the action area and adjacent remaining stands.
- A total of 4 acres of nest groves would be modified and maintained;
- A total of 233 acres of Post Fire Foraging habitat would be removed due to proposed treatments.

Northern Spotted Owl Critical Habitat

The proposed activities ***may affect but is not likely to adversely affect*** *the critical habitat for the following reasons:*

- Project actions would not remove or downgrade any PBFs in critical habitat;
- PBFs are only located in salvage and roadside units where trees with 100% probability of mortality would be removed;
- The maintenance of snags and downed logs within the treatment units would provide potential foraging roosts and prey species habitat if NSO do forage in high severity burned areas;
- Protection of remaining areas of unburned vegetation and other residual legacy elements would serve as remnant wildlife structure as the area transitions through seral stages;
- The snag and coarse woody debris retention guidelines from the LRMP would provide for potential foraging perches and prey habitat if NSO are using the area to forage;
- LOPs would protect any remaining Nesting/ Roosting habitat and valid activity centers from all disturbance and work activity;
- The action area has a high percentage of untreated lower-severity burned areas;
- A high amount of unburned, untreated suitable NRF habitat would be available for foraging in home ranges within the north eastern and southern portion of the action area;

- Openings created by salvage operations would increase shrub habitat used by NSO prey such as woodrats, mice, and voles;
- No smoke and fire disturbance would occur during the breeding season.
- Only a small amount of PFF would be treated in comparison to the remaining acres in the action area and across the forest landscape.
- Treated PFF areas would be a point a focus of replanting in restoration plans of phase 2.

No Action

Direct and Indirect Effects

Taking no action in the short term would result in no direct effects to listed, proposed, or sensitive species or habitats pertaining to these species. No potential human-caused disturbance would result due to a lack of proposed management such as those described for the action alternatives.

Indirectly, the no-action alternative would maintain habitats in existing conditions and trends. There would be no immediate change in snag density or recruitment of large snags. In addition, current conditions would remain, and no habitat restoration would occur. However, without treatment and in the long term, fuel levels would increase due to fire-killed trees falling, resulting in larger reburn potential, and non-native invasive plant species would continue to reduce diversity, and thus suitable habitat, within the project area.

4.10.2. Other Species Considered

Other wildlife species were considered for impacts due to the proposed project. These are in addition to those listed under the federal Endangered Species Act, and include the Regional Forester's Sensitive Species List, Management Indicator Species, and Migratory Birds. Additional information on species can be found in the Biological Assessment and Evaluation, MIS report, or Migratory Birds report. *Species analyzed further in this EA are: Northern Goshawk, Bald Eagle, American Peregrine Falcon, Townsend's Big-Eared Bats, Pallid Bats, Fringed Myotis, American Marten, Pacific Fisher, North American Wolverine, Foothill Yellow Legged Frog, and Western Pond Turtle.*

Northern Goshawk (NOGO)

Because there are no known nests; breeding disturbance and direct effects are not expected to occur. Noise and smoke potentially could displaced individuals if present; however, goshawks are not likely to perch in high burn severity units.

Based on the minor effects to prey species and the potential alteration of some foraging habitat, indirect impacts are expected.

Bald Eagle

Bald eagle nesting habitat and reproduction would not be affected by proposed treatments. Based on very minimal sedimentation impacts to prey fish species, direct or indirect impacts are not expected. *Because there are no direct or indirect effects anticipated by management actions (salvage, fuels reduction) on public or private land, no cumulative effects are anticipated by any of the proposed actions.*

American Peregrine Falcon

Peregrine falcon nesting sites would not be disturbed, altered or removed; treatments would open up areas for foraging. Although foraging birds may be temporarily displaced during treatment, it would have little effect on foraging success due to the large size of home ranges. Based on this information, direct effects would not be expected.

Since only a small percentage of prey species potentially could be temporarily displaced (but still available as prey) or nests disturbed and given the large foraging range of peregrine, indirect effects would be minimal. Because there are no direct or indirect effects anticipated by management actions (salvage, fuels reduction) on public or private land, no cumulative effects are anticipated by any of the proposed actions.

Townsend's Big-Eared Bats, Pallid Bats and Fringed Myotis

Based on potential disturbances of maternal colonies, removal of snags and hazard trees that could be used for Roosting/ Perching, and potential opening of Foraging habitat, direct impacts could occur. Noise from the proposed project has the potential to disturb pallid bats in their day roosting cavities. However, it is unlikely that noise disturbance would cause females to abandon their young due to their ability to carry pups from roost to roost during normal roost-switching behavior. The tendency for bats to switch roosts often under normal circumstances would reduce any negative effects to reproduction.

Salvage logging may have short-term effects to prey species and foraging habitat. However, based on the bats' large foraging ranges, the amount of untreated vegetation, and the temporary nature of the project, project effects to bat foraging habitat are expected to be insignificant and temporary.

Due to the extent of suitable snags and coarse woody debris that will be left within the project action area, the designation of LOPs around any rock outcrops with found colonies and the limited projects on private land within the planning area, cumulative effects are anticipated to be minimal for the Townsend's big-eared bat, pallid bat and the fringed myotis. Impacts from the proposed project are considered to be minor for these bat species, and therefore will not create adverse effects when combined with past activities on the Forest and those on adjacent private land.

American Marten, Pacific Fisher, North American Wolverine

Based on the lack of known denning habitat in the project area and the large size of territories, direct effects are not expected. Historical sightings for marten and fisher have occurred in the project action area; however, with the burned over landscape, any individuals sighted in the near future would likely be dispersing individuals. Potential noise and smoke disturbance from treatment could occur if individuals are present; however, the likelihood of any individual being present during treatment is minimal to none.

These mustelids have been known to continually use burnt landscapes to forage since their home range covers a very large area. Foraging habitat and prey species could be impacted from salvage and fuels treatments, but with snag and CWD retention guidelines, foraging habitat can still remain functional. However, alteration of any foraging habitat would result in indirect effects to marten, fisher and wolverine.

<u>Analysis Common to aquatic related wildlife</u>

Sedimentation caused by commercial salvage, roadside salvage, watering of roads and fuels reduction could travel from disturbed sites to Butte Creek, Pinto Creek, Atchison Creek, Cold Creek, Plaskett Creek and other unnamed tributaries flowing into Black Butte River. Pile and understory burning would

consume small surface fuels and expose soils to the possibility of sediment transport. The areas prescribed for fire would occur in commercial salvage units and roadside salvage units. These prescribed burns typically burn at low intensity and do not consume all small surface fuels. Therefore, in an event erosion does occur within proposed burning areas, the probability of sediment entering watercourses is low.

The implementation of BMPs, water drafting design criteria, water drafting LOPs, SMZ buffers, protection of riparian reserves and adherence to the Aquatic Conservation Strategy would minimize sedimentation into drainages. Proposed treatments are very unlikely to cause a significant decline in aquatic species populations.

Use of existing roads under this project would not remove or modify any suitable habitat for aquatic species. Major routes through the project area are Forest Highway 7 and 22N11. Haul routes from the project area would involve secondary roads that flow into Forest Highway 7. In general, these routes receive moderate to high level of vehicular traffic. Hauling would occur after the breeding season for amphibians. Erosion control measures/ BMPs required for hydrology would minimize sedimentation into watercourses.

Foothill Yellow-legged Frog (FYLF)

Based on the implementation of stream water drafting LOPs, BMPs, SMZ buffers and hydrologic design criteria to eliminate disturbance to frogs, there would be no direct effects. Due to the low potential for detrimental levels of sediment introduction and adherence to BMPs, sediment would have minimal to no effect to stream habitat. Based on the low potential for detrimental levels of sediment introduction, the adherence to Design Features including BMPs and minimal effects to prey species, there would be no indirect effects to the FYLF.

Because there are no direct or indirect effects expected as a result of management actions on public or private lands, no cumulative effects are anticipated by the proposed actions.

Western Pond Turtles (WPT)

Implementation of stream water drafting LOPs, BMPs, SMZ buffers and hydrologic design criteria would minimize sedimentation. Based on the minimal effect to prey species and minimal amount of sediment loading, there would be no indirect effect to western pond turtles.

Vehicular traffic and mechanical equipment have the potential to crush and disturb turtles as they can be present along roads, within and adjacent to treatment units. However, the likelihood of direct mortality is low based on the timing of implementation, focus of work is not in-channel or pools, tributaries within the action area do not provide optimal habitat and turtles tend to displace rather quickly from large disturbances. Based on the minimal potential for disturbance to breeding turtles and overwintering turtles, impacts are not expected to be adverse or significant to the viability of populations.

Cumulative Effects

Under NEPA (40 CFR 1508.7), cumulative effects represent the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." The following are anticipated cumulative effects within the Action area. Based on the analysis provided in this report and the following rationale, it is anticipated that implementation of this project, in combination with the past, present, and reasonably foreseeable future actions, would not result in an adverse effects determination for forest sensitive species in this document.

Cumulative effects include the effects of future, State, local or private actions that are reasonably certain to occur in the planning area. Future federal actions that are unrelated to the proposed action are not considered because they require separate consultation pursuant to Section 7 of the Endangered Species Act. Current habitat conditions are assessed to determine the cumulative effects of past actions. It is then evaluated how the action alternative, along with other concurrent and foreseeable actions, would alter existing habitat.

Concurrent and Reasonably Foreseeable Actions
Proposed treatments for the Plaskett-Keller project would occur on **2,164** acres of forest service land. Late successional habitat and nest groves for owl and goshawk activity centers that species depend on would not be treated. The best quality habitat for northern spotted owl would be maintained and not removed or downgraded.

It is anticipated that the implementation of the Plaskett-Keller project, in combination with past, present and reasonably foreseeable actions, would not result in adverse effects or result in a trend towards federal listing for Northern goshawks, marten, fisher, wolverine, the 3 bat species, foothill yellow-legged frogs and western pond turtles. Although some habitat could be potentially removed or downgraded, it is very minimal in comparison to the landscape of the action area and forest. Home range functionality would not be reduced.

Continued management in this project area combined with the Plasket-Keller project should not affect population levels for these species across their range. Late successional habitat would remain intact as no treatment would occur and if future late successional reserve (LSR) habitat were to be modified, all LSR Assessment guidelines (USDA Forest Service, 2000) would be followed. All treatments would occur only in matrix lands. By following snag and woody debris retention guidelines in the LRMP, wildlife snags and trees would be more than abundant in units and outside of units after treatment has occurred.

The Smokey timber and fuels project discussed in above sections still has mastication units proposed for 2022 and beyond. Those units overlap with approximately 486 acres of the Plaskett-Keller August Complex Phase 1 action area. The Cold Springs and Powell CE salvage projects are proposed on the north eastern edge of the Plaskett-Keller project action area. These projects are not unlike the Plaskett-Keller project, as they are salvage projects with fuels reductions subsequent to the August Complex fire. Treatments include commercial salvage units, roadside salvage and fuels reductions after salvage. These treatments would meet the same purpose and needs as the Plaskett-Keller project. Snags considered hazardous would also be removed within 200 feet of the roads within that project; however, abundant snags exist on the landscape and will be retained. The Plaskett-Keller project directly overlaps Cold Springs and Powell salvage projects, which combined total approximately 468 acres. Both of these projects would completely stay out of last successional reserves, protecting the highest quality habitat for late seral dependent species.

Table 32. Total cumulative treatment acres for Smokey, Cold springs and Powell salvage projects within the Plaskett-Keller Project Action Area (AA).

Treatment	Smokey	% of AA	Cold Springs	% of AA	Powell	% of AA	Total (acres)	% of AA
Timber harvest, thinning/ fuels	0	0	0	0	0	0	0	0
Commercial/fuels Salvage/ Roadside	486 (masticati on)	1.6	225	0.7	0	0	711	2.3%
Total	**486**	**1.6%**	**225**	**0.7%**	**0**	**0**	**711**	**2.3%**

Future fuels treatments would beneficially affect remaining suitable habitat in the project area given implementation of appropriate LOPs to reduce effects of noise disturbance.

No timber harvest plans (THP) are currently planned in or near the project area. The CalFire web site which contains the list and location of all THPs was checked on December 3rd, 2021. Private land activities include agriculture, grazing, domestic use, timber harvest, and fuel treatments. Timber harvest has occurred in adjacent areas and is expected to continue on corporately owned timber ground. Impacts to all species analyzed and their habitat from the proposed project are considered to be minor based on the already burnt landscape, and therefore will not create adverse effects when combined with past activities on the Forest and those on adjacent private land.

Although small amounts of suitable habitat for wildlife species maybe impacted in the short term, the long-term benefits would include a reduction of surface fuels preventing future wildfires and protection of remaining late successional habitat. Reducing surface fuels conditions would also benefit the watershed and aquatic health by reducing the potential for sediment wasting.

For a full analysis of the cumulative effects including past actions refer to the wildlife biological assessment and evaluation.

Summary of Determination of Effects:
The proposed action may affect/impact the following FSS species or its habitat:

Northern Goshawk

It has been determined that the Plaskett-Keller August Complex Phase 1 project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the northern goshawk. This is based on the current lack of nesting habitat in the project area, the minor effects to prey species, and that although foraging habitat may be altered, it will remain functional.

Pallid, Townsend's Big-eared, and Fringed Myotis Bats

It has been determined that the Plaskett-Keller August Complex Phase 1 project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Townsend's Big-eared bat, Pallid bat or Fringed Myotis. This is based on the potential effects to roosting bats and habitat, the

abundance of snags and foraging habitat outside the treatment units, the ability of the treatment units to provide roosting and foraging habitat after treatment, and the limited effects to prey species.

American Marten, Pacific Fisher and North American Wolverine

It has been determined that the Plaskett-Keller August Complex Phase 1 project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the American Marten, Pacific fisher, or North American Wolverine. This is based on the lack of denning habitat in the project area, the large size of their home ranges, the limited effects to prey species, and that although foraging habitat may be altered, it will remain functional.

Western Pond Turtle

It has been determined that the Plaskett-Keller August Complex Phase 1 project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the Western pond turtle. This is based on a lack of known nesting sites, the limited effects to aquatic prey species, and that although potential for direct disturbance is present, the likelihood is low.

It has been determined **that this project will not affect/impact any Forest Service sensitive species listed below or their habitat:**

- American Peregrine Falcon
- Bald Eagle
- Foothill Yellow-legged Frog

Management Indicator Species (MIS)

The proposed treatments would not significantly reduce the MIS habitat elements assessed in the MIS analysis, specifically for snags and coarse woody debris. Nor is the proposed action expected to adversely affect the viability of this MIS that associate with those MIS habitat elements based on these determinations:

- The August Complex Fire burned with high severity through all habitats in the treatment areas which eliminated or substantially reduced habitat in those areas. Snag and coarse woody debris are the predominate MIS habitat elements remaining in the treatment areas.
- We do not anticipate that the proposed treatments will significantly affect the availability of snag habitat for MIS species. Snags will not be removed from the 1.3-mile buffer of the Action Area, and some snags will remain in the treated areas after treatment. Additionally, we expect at least an average of 4 snags remaining per acre across the action area, and there will continue to be an abundance of snag habitat throughout the 1,000,000+ acre August Complex burn for the following decades. Given this information, we do not expect that the proposed treatments will adversely affect the overall snag availability for MIS.
- Although snags numbers would be reduced within the commercial and roadside units, abundant snags per acre based on retention would exist both within and outside the treatment units after implementation.
- Treatment units are within moderate to high severity burned stands. Low severity areas would have very few dead trees; therefore, very few trees removed. The moderate to high burn severity resulting stand conditions (reduced canopy closures and 50 to 100% tree mortality) now fall under low capability for these species. Treatments would not further reduce the capability level.

- The Action Area would maintain, across the forested landscape, the average number of snags required to meet High capability for all four species.
- Existing CWD will not be removed as part of the proposed treatments and more CWD will be created during the project implementation. Therefore, this CWD is expected to exceed 4 logs per acre and these CWD estimates are expected to meet the needs for MIS including for pileated woodpeckers.
- Although snags numbers would be reduced (but not eliminated) within the units, an abundance of snags would remain both within and outside the treatment areas.
- Treatment units are mostly within moderate to high severity burned stands. The resulting stand conditions (reduced canopy closures and 50 to 100% tree mortality) now fall under low capability for these species. Treatments would not further reduce the capability level.
- The Action areas would maintain, across the forested landscape, the average number of snags required to meet High capability for snag dependent species.

Therefore, my conclusion is that the proposed action would not have adverse effects on habitat for these species, and that the proposed action compiles with the standards in the Forest Plan regarding site-specific evaluations for Management Indicator Species.

Migratory Birds

The project will not adversely affect migratory landbird species or their associated habitats. Potential effects to migratory species would be minimized through the retention of non-hazardous snags/down woody debris, riparian reserve buffers, riparian and streamside management zone protection, snag and CWD retention and retention of hardwood species. Although some proposed project actions may have short-term adverse effects on some individual birds, eggs, or nests, we do not expect adverse effects to the populations of those species. Additionally, potential adverse effects to migratory bird species have been reduced through the adherence of Forest Plan Standards and Guidelines including for snag/down woody debris retention standards and others project design criteria.

4.11. Carbon and Climate Change

The actions proposed within the Plaskett-Keller project are likely to have minimal short-term effects on the Mendocino National Forest's ability to sequester and store carbon. They, instead, are more likely to improve the area's long-term ability to absorb and store carbon, as well as reduce future greenhouse gas emissions. Additional details on this analysis can be found in the Carbon reports for this project.

Short-term Effects

The Plaskett-Keller project proposes to harvest a portion of dead and severely injured trees, as well as conduct hazardous fuel reduction activities, such as prescribed burning and removal of excess logging debris. These actions are likely to have minimal carbon effects because of the relatively small size of the project area, as well as the limited sequestration capacity of the targeted vegetation.

These proposed actions will occur on about 2,200 acres, which represent 0.003 percent of the Mendocino's 739,032 forested acres. Carbon losses from the forest ecosystem associated with harvests have been relatively small compared to the total amount of carbon stored in the forest, with losses from 1990 to 2011 equivalent to about 0.6percentof non-soil carbon stocks (Birdsey et al. 2019). Greenhouse gas emissions from logging equipment and lost carbon from ground disturbance were also found to be negated by the surge in sequestration from new vegetative growth (Nave et al. 2010, McKinley et al. 2011).

Similarly, negative carbon stocks resulting from fuel reduction projects were found to be recovered and surpassed within 7 to 10 years of treatment (Hurteau 2010, Wiechmann 2015).

Negative carbon effects from the proposed actions are further mitigated by the project's focus on dead and severely injured trees. Dead trees don't absorb carbon like their living counterparts (Hansen 2014). And although dead and dying trees are capable of maintaining a large percentage of their carbon stores (Moore 2013), that storage continues at varying degrees, depending on how the wood is used (Negro 2019, Skog, et al. 2014).

Furthermore, wood can be used in place of other materials that emit more greenhouse gases, such as concrete, steel, and plastic (Gustavsson et al. 2006, Lippke et al. 2011, McKinley et al. 2011). Likewise, biomass can be burned to produce heat or electrical energy, or converted to liquid transportation fuels that would otherwise come from fossil fuels.

Long-term effects

The Intergovernmental Panel on Climate Change recognizes wood and fiber as a renewable resource that can provide lasting climate-related mitigation benefits that can increase over time with active management (IPCC 2000). In fact, removing carbon from forests for human use can result in a lower net contribution of greenhouse gases to the atmosphere than if the forest were not managed (McKinley et al. 2011, Bergman et al. 2014, Skog et al. 2014).

A 2014 report from the panel identified the conversion of forests to agricultural or developed landscapes as the largest cause of greenhouse gas emissions specific to forestry (IPCC 2014). However, no such land conversion is part of the Plaskett-Keller project. On the contrary, the subsequent reforestation of the area will result in a longer-term carbon sink as trees are the most prolific in their carbon absorption as they near full size (Schaedel 2017). Furthermore, reducing overall stand density, one of the outcomes of this proposed action, is consistent with adaptation practices to increase resilience of forests to climate-related environmental changes (Joyce et al. 2014).

Reducing the volume of dead fuels, combined with period prescribed burning, should also have the long-term effect of reducing carbon emission resulting from large-scale, high-intensity wildfires. In fire-prone forests, land management practices that reduce likelihood of stand-replacing wildfires—such as forest thinning and prescribed burning—have the potential to reduce carbon release from live biomass during such occurrences by as much as 98 percent (Hurteau 2008).

Actions proposed under the Plaskett-Keller project are consistent with options proposed by the Intergovernmental Panel on Climate Change for minimizing the impacts of climate change on forests, thus meeting objectives for both adapting to climate change and mitigating greenhouse gas emissions (McKinley et al. 2011). The relatively small quantity of carbon released to the atmosphere and the short-term nature of the effect of the proposed actions on the forest ecosystem are justified, given the overall change in condition increases the resistance to wildfire, drought, insects and disease, or a combination of disturbance types that can reduce carbon storage and alter ecosystem functions (Millar et al. 2007, D'Amato et al. 2011).

5. Agencies or Persons Consulted

The Forest Service consulted over 200 individuals, Federal, State, tribal, and local agencies during the development of this EA.

Public agencies consulted include: US Fish and Wildlife Service, NOAA Fisheries (NMFS), Natural Resource Conservation Service (NRCS, 5 counties), Bureau of Land Management, US Congressional Representatives (4 districts), local and surrounding tribes (6 tribes total), California Water Quality Control Boards (North and Central Valley), California Department of Fish and Wildlife, CalFire, County Board of Supervisors (5 counties), County Department Public Works (5 counties), County Fish and Game Commission (3 counties), Mendocino Farm Bureau, Resource Conservation Districts (4 counties), and City Planning Departments (5 cities).

A news release along with the scoping letter was sent out on February 10, 2021, initiating the scoping period for this project. The Willits News, Mendocino Voice, and Chico ER also covered the scoping. A virtual public meeting was held on April 1, 2021 to provide the public with information on post-fire recovery as well as the Plaskett-Keller Project. Participants had the opportunity to ask questions or provide comments. Approximately 45 individuals signed onto this meeting. By the end of the scoping period, 29 individual letters were received, along with 586 identical letters signed by 586 individuals. A full list of individuals and organizations may be provided upon request.

Legal notification for the 30-day opportunity to comment on the preliminary Plaskett-Keller Project EA was published in the Chico Enterprise Record newspaper on August 6, 2021. Eighteen unique letters were received during this time as well as 260 identical letters signed by 260 individuals.

A field trip was held on Saturday October 16, 2021 and 25 members of the public attended.

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7. Appendix A - Additional Maps

See following pages for any additional maps.

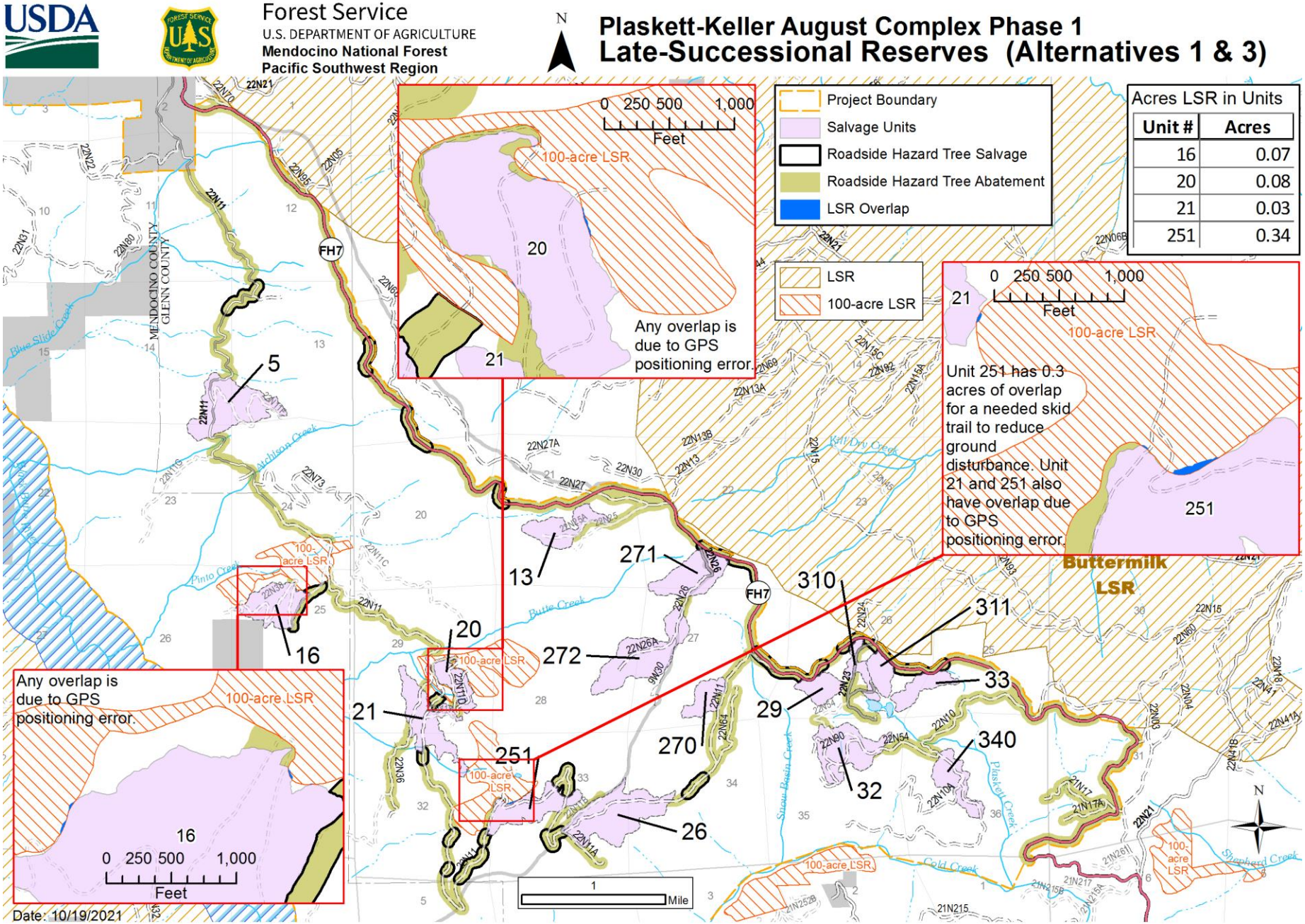


Figure 25. LSR and Alternative 1 and 3

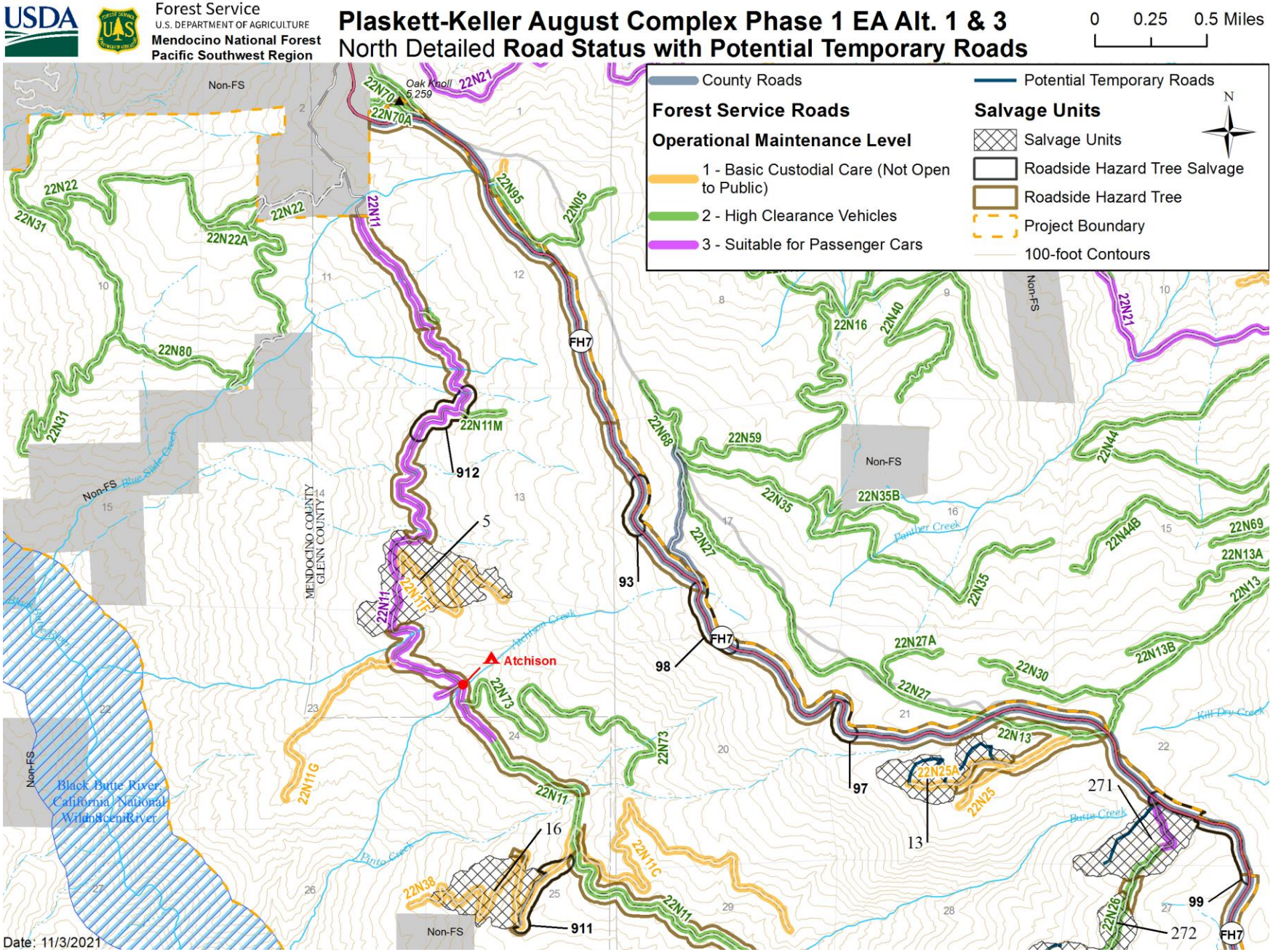


Figure 26. Northern Project Area Road Status

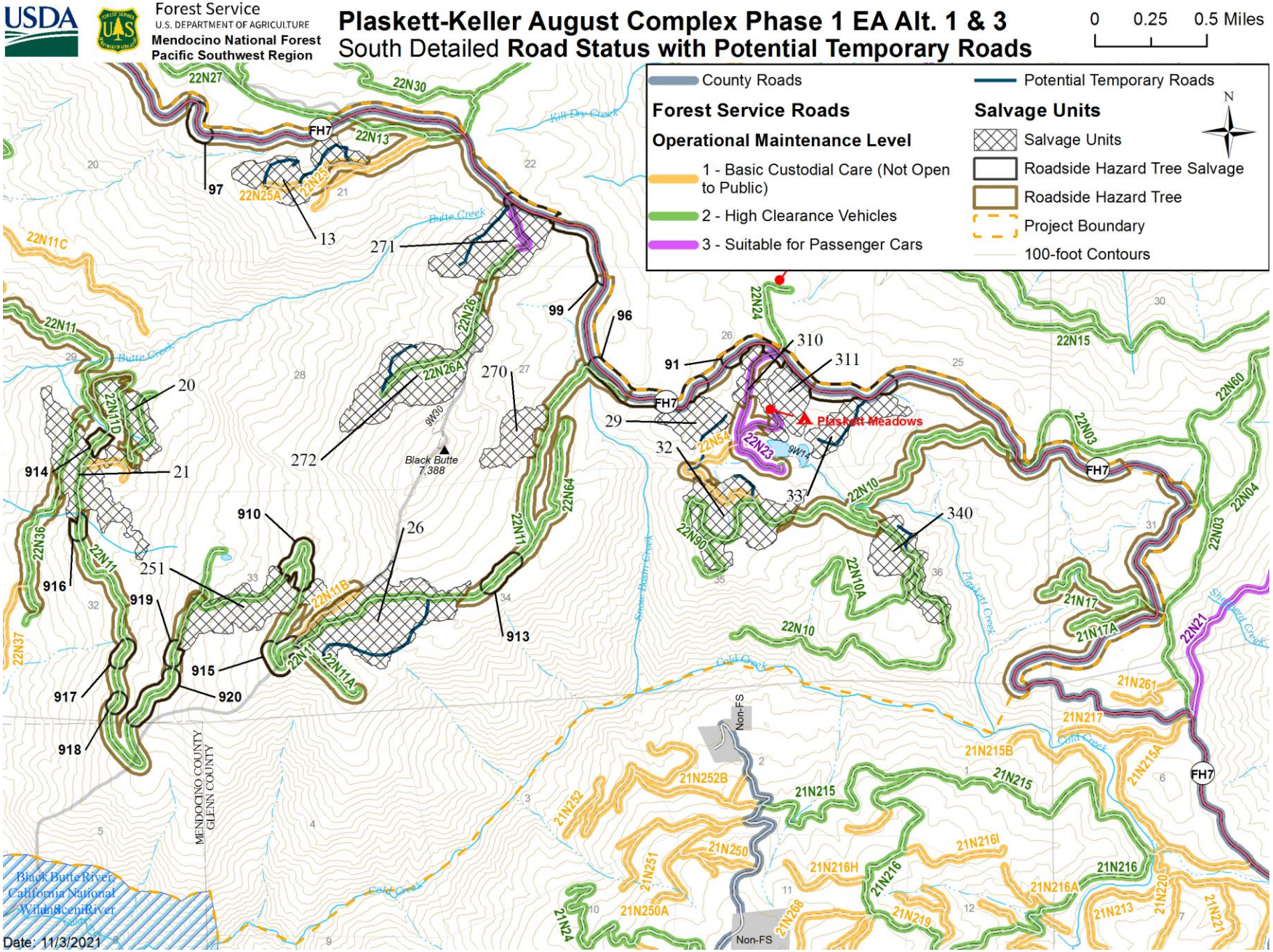


Figure 27. Southern Project Area Road Status

8. Appendix B - Design Features

8.1. Aquatics

Streams:

No potential water drafting sites have been identified within fish bearing streams, but any water drafting within aquatic habitat would follow the following design features: Locate water drafting sites to avoid adverse effects to in-stream flow and depletion of pool habitat.

- Keep streambank and in-channel excavation to a minimum.
- Use pumps with low entry velocity (350 GPM) to minimize removal of aquatic species.
- Use screening devices on water drafting pumps to avoid juvenile fish removal.
- If drafting out of fish bearing streams is deemed necessary, consult with the district biologist prior to drafting.
- For in-channel water drafting locations, rock approaches and place rock barriers or slope drafting pads away from water source to prevent spillage at vehicle from returning to the watercourse.

If drafting from streams, apply an LOP from March 15 to June 15 unless it is determined **foothill yellow-legged frogs** are not present or suitable habitat does not exist. This LOP may require an extension if larvae or eggs are located in the immediate vicinity of the drafting sites.

Ponds/ Lakes:

Maintain a minimum of 20" of water in the deep end of the pond at all times and use screen cover drafting devices (described below). Place intake pipes within the deepest portion of a water impoundment.

- Use a Forest Service approved screen-covered drafting box, or other device to create a low entry velocity, at **all designated drafting sites** to minimize removal of any aquatic species. Use a low-velocity water pump and do not pump natural ponds to low levels beyond which they cannot recover quickly (approximately one hour). Place hose intake into bucket in the deepest part of the pool.
- Drafting may occur at Plaskett Lakes as it has been approved as a designated drafting site by the district biologist.

Screen mesh criteria:
Screen mesh must be in good repair and present a sealed positive barrier effectively preventing entry of the “design fish” into the intake. The design fish in this case is an immature (20-30mm) salmon or steelhead fry.
Screen mesh size shall be:

- Round openings – max. 3/32 inch diameter (.09 inch)
- Square openings – max. 3/32 inch diagonal (.09 inch)
- Slotted openings – max. 1/16 inch width (.07 inch)

8.2. Botany

Flag known occurrences of Endangered, Threatened, and Sensitive plant species for avoidance with yellow-and-black striped flagging prior to implementation. Avoid the following specific activities within a flagged avoidance area:

- Constructing landings
- Decking logs
- Creating burn piles, either by hand or with machines
- Use of heavy equipment, including masticators

Standard Mitigations to Reduce Invasive Species Introduction and Transfer:
Equipment operators should always thoroughly clean their equipment prior to entering the project area. Properly cleaned equipment will have no visible soil, plant parts, or seeds present. Avoid staging equipment and vehicles in infested areas. If equipment is staged in infested areas, equipment should be cleaned before moving to another part of the project. These areas are described in the Botany Report within unit 26 and 270.

8.3. Fuels

Fuel accumulation would be reduced to no more than 10 tons/acre by removing merchantable timber and biomass and by burning slash piles.

Proper mitigation measures to meet air quality requirements would be implemented under the Plaskett-Keller Project. A prescribed fire planner would coordinate with the Air Quality Management District (AQMD) to mitigate emissions from fuel reduction burning. Burning permits would be acquired from the AQMD. The AQMD would determine permissive burn days, based on California Air Resource Board's (CARB's) daily information on "burn" or "no burn" conditions. Burn plans would be designed and all fuel reduction burning would be implemented in a way to minimize particulate emissions. Prescribed fire implementation would coordinate daily and seasonally with other burning permittees both inside and outside the forest boundary. Because of the mitigation measures applied and coordination with regulatory agencies and other prescribed burners any impacts are expected to be minimal.

8.4. Geology

- For safety, workers should be aware when they are within active landslide areas, rockfall areas, and talus areas. Workers should take reasonable precautions and should not disturb active landslides or talus areas.
- Protect known and previously unidentified caves from being physically disturbed by project activities.
- Protect areas of instability from ground disturbance by excluding ground-based equipment and salvage (harvest) activities from unstable areas (riparian reserves) such as landslides and inner

gorges. Inner gorges are streamside slopes above 65% slope. (LRMP IV-30 #3(a)5 and LRMP IV-33 #2)

- In unstable riparian reserves, protect unstable areas from ground disturbance by directional felling. Keep felled trees on-site when needed to meet coarse woody debris objectives (modified LRMP IV-20 #16)
- Exclude ground-based equipment and salvage from meadows including wet and dry meadows or glades. Skidding, for example, is prohibited in dry meadows even in Hazard Tree Abatement areas, such as at Yellow Jacket Glade, Plaskett Meadows meadow system, and grassy areas along FH-7.
- Use existing logging infrastructure whenever possible, including old landings and grown-over logging roads.
- Prohibit new landings in:
    - Glades (dry meadows) including Yellow Jacket glade
    - Riparian Reserves including active landslides, inner gorges, and wet areas such as at Plaskett Meadows (LRMP IV-18 #5(a))
    - The eastern lateral moraine coming off Black Butte Mountain
    - Talus areas, where the ground surface is covered in rock with very little bare mineral soil is exposed.
- Prohibit new temporary roads in:
    - Glades (dry meadows) including Yellow Jacket glade
    - Riparian Reserves including active landslides, inner gorges, and wet areas such as at Plaskett Meadows (LRMP IV-18 #5(a))
    - The eastern lateral moraine coming off Black Butte Mountain
    - Talus areas, where the ground surface is covered in rock with very little or no bare mineral soil is exposed.
- Construct landings and temporary roads where hillslopes and fills would remain stable.
- Exclude heavy machinery from talus areas where no mineral soil can be seen
- If a previously unmapped suspected landslide is located during implementation, contact the project geologist to determine its riparian reserve status.
- Prohibit borrow pits unless necessary additional NEPA is completed and State requirements are met. Do not use talus areas for any amount of borrow (mineral material) such as for rocked fords.

8.5. Heritage

Due to the sensitive heritage sites within Plaskett Campground (Unit 310), archaeological monitors will be requested from the Round Valley Indian Tribe and Grindstone Rancheria during implementation of this unit.

If new archaeological resources are located during project implementation, halt project activities until the district archaeologist can assess the situation.

Protect all National Register-eligible or unevaluated archaeological sites within the project APE with Standard Protection Measures.

Flag all archaeological sites for avoidance from ground disturbing activities prior to implementation. Mark the perimeter of each site with orange and white diagonal striped flagging tape. In most cases for these flagged areas, hazard trees may be felled but not removed by skidding or other ground disturbing actions. Felled trees may be cut and portions removed using a crane/self-loader that can reach into the flagged site boundaries to pluck the logs (full suspension) and remove them without ground disturbance (Class II SPM: 2.2(a)(2,4)).

For archaeological sites bisected by the project roads, the road-bed may be used by mechanical equipment for access if needed.

The District Archaeologist or their designee shall monitor (SPM 1.5) work within site boundaries during implementation to ensure that any on-site hazard trees are removed according to these stipulations.

Project implementers shall contact the District Archaeologist **prior to implementation** to ensure that all sites are flagged and to coordinate any monitoring logistics.

Pile slash off heritage sites; remove by hand without skidding. If portions of felled trees extend off site, cut the trees at the site boundary; only the portion outside of site boundaries may be removed using skidding or other ground disturbing methods.

Identify these types of activities on each site with an archaeologist present to ensure the protection of historic properties. On rare occurrence, a tracked loader may be allowed on site within a previously disturbed area **as long as** an archaeologist is present.

Isolates, or non-formally recorded resources, have limited quantities of cultural materials, have no historic context (i.e., fences, ditches, etc.) or are modern. No protection measures/recommendations are required for isolates.

Any heritage properties that have been tested and determined ineligible for listing in the National Register require no protection measures due their National Register status.

If any new heritage resources are discovered during project implementation, cease all work in that area, and notify the Forest or Zone archaeologist to evaluate the significance of the resource.

8.6. Hydrology

Forest management and associated road building in the steep rugged terrain of forested mountains has long been recognized as sources of non-point water quality pollution. Non-point pollution is not, by definition, controllable through conventional treatment means. It is controlled by containing the pollutant at its source, thereby precluding delivery to surface water. Sections 208 and 319 of the Federal Clean Water Act, as amended, acknowledge land treatment measures as being an effective means of controlling non-point sources of water pollution and emphasize their development.

The Forest Service has developed and documented non-point pollution control measures for National Forest System lands. These measures labeled "Best Management Practices" (BMPs), are designed to accommodate site specific conditions. The following BMP's have been identified to address watershed management concerns and are from the 2012 Forest Service publication "National Best Management Practices for Water Quality Management on National Forest System Lands" (USDA USFS 2012). The implementation monitoring is done after the project has been completed, before the winter season. Effectiveness monitoring determines success of BMP implementation after one winter. **All work and hauling should be done outside of the rainy season when soils are dry and potential damage to roads are minimized.**

Road 10 and Chem 5 (Equipment Refueling and Servicing/ Chemical Handling and Disposal)

Objective
Chem 5- Avoid of minimize water and soil contamination when transporting, storing, preparing, and mixing chemicals; cleaning equipment or disposing chemical containers.
Road 10- Avoid or minimize adverse effects to soil, water quality, and riparian resources from fuels, lubricants, cleaners, and other harmful materials discharging into nearby surface waters or infiltrating through soils to contaminate groundwater resources during refueling and servicing activities.

Application- Handling chemicals, chemical containers and equipment (including petroleum-based) can lead to contamination of surface water or groundwater if not done carefully. Spills, leaks, or wash water can contaminate soil and leech into groundwater. Residue left on containers or equipment can wash off during precipitation events and enter surface waters.

Containers should be inspected on a regular basis to ensure no leaks and stored away from riparian reserves. Spill kits should be available in case of an accidental spill. All waste should be disposed of according to state, federal and local regulations.

Road 4 (Road Operations and Maintenance)

Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by controlling road use and operations and providing adequate and appropriate maintenance to minimize sediment production and other pollutants during the useful life of the road.

Application- Consideration is given to the potential water quality effects from road damage when oversize or overweight loads are driven over forest roads. Roads should be routinely inspected to ensure they are not being impacted by log trucks. Water all dirt roads to minimize dust.

Road 5 (Temporary Roads)
Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from the construction and use of temporary roads.

Application- Temporary roads may be used in situations where access needs are short-term and the roads can be constructed without requiring advanced engineering design or construction practices to avoid, minimize, or mitigate adverse effects to resources. Practices related to road location and stormwater and erosion control should be applied to temporary roads. Temporary roads are to be decommissioned and the area returned to resource production after the access is no longer needed.

Road 7- (Stream Crossings)

Objective-Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when constructing, reconstructing, or maintaining temporary and permanent waterbody crossings.

Application-Construction, reconstruction, and maintenance of a crossing usually requires heavy equipment to be in and near streams, lake, and other aquatic habitats to install or remove culverts, fords, and bridges, and their associated fills, abutments, piles, and cribbing. Such disturbance near the waterbody can increase the potential for accelerated erosion and sedimentation by altering flow paths and destabilizing streambanks or shorelines, removing vegetation and ground cover, and exposing or compacting the soil. Use of heavy equipment has a potential for contaminating the surface water form vehicle fluids or introducing aquatic nuisance species.

Veg 2 (Erosion Prevention and Control)

Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources by implementing measures to control surface erosion, gully formation, mass slope failure, and resulting sediment movement before, during, and after mechanical vegetation treatments.

Application- The process of erosion control has three basic phases; planning, implementation, and monitoring. During planning, areas subject to excessive erosion, detrimental soil damage and mass failure can be identified and avoided. Suitable erosion control measures are implemented while the maintenance of implemented measures will ensure their function and effectiveness over their expected design period.

The potential for accelerated erosion or other soil damage during or following mechanical treatments depends on climate, soil type, site conditions, and type of equipment and techniques used at the site. Erosion control measures are grouped into two general categories: structural measure to control and treat runoff and increase infiltration and nonstructural measures to increase ground cover.

Veg 3 (Aquatic Management Zone) (Riparian Reserves & Streamside Management Zones)

Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when conducting mechanical vegetation treatment activities in AMZ.

Application- Designation of an AMZ around and adjacent to waterbodies is a typical BMP to avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources. Mechanical vegetation treatments are a tool that can be used within the AMZ to achieve a variety of resource-desired conditions and objectives when implemented with suitable measures to maintain riparian and aquatic ecosystem structure, function, and processes. Depending on site conditions and resource-desired conditions and objectives, mechanical vegetation treatments in AMZ could range from no activity or equipment exclusion to purposely using mechanical equipment to create desired disturbances or conditions. When treatments are to be used in AMZ, a variety of measures can be employed to avoid, minimize, or mitigate soil disturbance, damage to waterbody, loss of large woody debris recruitment, and shading, and impacts to floodplain function.

Veg 4 (Ground-Based Skidding and Yarding Operations)

Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources during ground-based skidding and yarding operations by minimizing site disturbance and controlling the introduction of sediment, nutrients, and chemical pollutants to waterbodies.

Application- Ground-based yarding systems include an array of equipment from hoses, rubber-tired skidders, and bulldozers, to feller or bunchers, forwarders, and harvesters. Each method can compact soil and cause soil disturbance, though the amount of impact depends on the specific type of equipment used, the operator, unit design, and site conditions. Ground-based yarding systems can be designed and implanted to avoid, minimize, or mitigate potential adverse effects to soils, water quality, and riparian resources.

Veg 6 (Landings)
Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources from construction and use of log landings.

Application- Landings are generally sites of intense activity, with lots of equipment working in these concentrated areas. Chemicals and fuels are often stored at these locations to service equipment, leaving a high probability of soil compaction, overland flow, and soil contamination. Any chemical and fuel containers should be disposed of appropriately, in addition to any refuse (tires, chains, chokers, cables, and miscellaneous discarded parts). Contaminated soils should also be disposed appropriately. Provide ground cover where necessary to prevent erosion.

WatUse3 (Administrative Water Development)
Objective- Avoid, minimize, or mitigate adverse effects to soil, water quality, and riparian resources when developing and operating water sources for Forest Service administrative and resource management purposes.

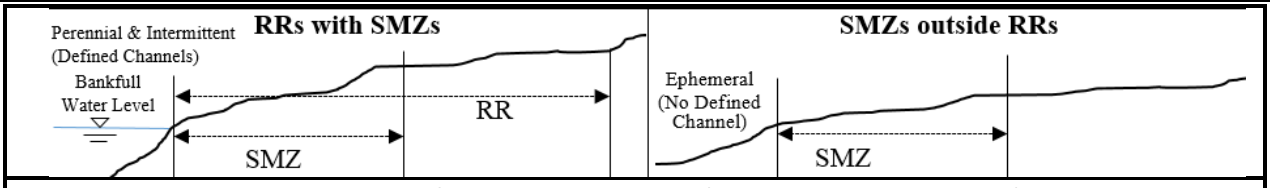
Application- Water source developments are needed to supply water for a variety of Forest Service administrative and resource management purposes, including dust control. Locations used for drafting should be preexisting locations. Utilizing a high-volume pump will help prevent water trucks from having to back down into water (which could have an effect on water quality if the truck has a leak).

BMP Checklist
This checklist was created as an easy way to ensure all BMP's are followed. BMP's have been characterized for applicability for pre, during, and post project. (Check boxes for each stage, greyed out boxes do not apply to that stage)

Pre	During	Post	BMP
Road 10- Equipment Refueling and Servicing / Chem 5- Chemical Handling and Disposal			
			Ensure refueling & servicing is only at locations well away from water or riparian resources.
			Transport & handle chemical/fuel containers in a manner that prevents leaks & spills.
			Inspect, secure, & check containers regularly.
			Store any chemicals, including fuels, outside of Riparian Areas. Install contour berms & trenches around vehicle service & refueling areas, chemical storage & use areas, & waste dumps to fully contain spills if necessary.
			Maintain a spill kit or containment device at all times.
			Dispose of containers & contaminated soils appropriately from NFS lands.
			Report spills & initiate appropriate clean-up action in accordance with applicable State & Federal laws, rules & regulations.
Road 4- Road Operations & Maintenance			
			Water all dirt roads used for hauling.
			Inspect roads/haul routes frequently to ensure roads are not being impacted by log trucks.
			Restrict use or modify route if road is being damaged, such as unacceptable surface displacement or rutting.
			Grade all roads used for hauling.

Pre	During	Post	BMP
			Maintenance Level 1 roads at the conclusion of project activities, need to be identify with strategies to reduce hydrologic connectivity and soil erosion. The sale administrator or other measures will include the following stated below for temporary roads: (1), (2) (3) and (5). Work will be done during the dry season. If possible, newly reconstructed level 1 roads should not be used for more than one season.
			Road 5- Temporary Roads
			Install sediment and stormwater controls before initiating surface-disturbing activities to the extent practicable
			Schedule construction activities to avoid direct soil and water-disturbance during periods of the year when heavy precipitation and runoff are likely to occur
			Routinely inspect temporary roads to verify that erosion and stormwater controls are implemented, functioning, and appropriately maintained.
			Maintain erosion and stormwater controls as necessary to ensure proper and effective functioning
			Use temporary crossings suitable for the expected uses and timing of use
			Temporary roads will be obliterated after serving their intended purpose for this project and need to be hydrologically neutral. This includes: (1) road effectively barricaded; (2) road effectively drained by measures such as re-contouring or outsloping to return surface to near natural hydrologic function; (3) a well distributed mulch or organic cover provides at least 70% cover, or road surface is revegetated using local native species; (4) sideslopes are reshaped and stabilized to match the natural contour (as necessary); and (5) stream crossings are removed, and natural channel geometry is restored.
			Road 7- Stream Crossings
			Cross small streams (width-wise) and ephemeral or intermittent streams where possible.
			Utilize previous crossings, if appropriate.
			Cross stream directly, not at an angle.
			Cross streams where the stream bottom is stable and the banks are low and intact. If stream bottom is not 'hard', consider reinforcement with rock (including approaches).
			Long approaches to the crossing should have runoff/sediment control (divert water off the road onto the forest floor)
			Where possible, install an appropriate structure (bridge, culvert, pole ford, etc) to minimize rutting and erosion.
			For Culverts, minimum size should be 18 inches and extend a minimum of one foot beyond the upstream and downstream tow of backfill placed around the culvert. Length should not exceed 40 feet. Filter Cloth: place filter cloth on the streambed and stream banks before installing the culvert and backfill. The filter cloth should extend a minimum of six inches and maximum of one foot past the toe of the backfill. Culvert placement: The culvert should be installed on the natural stream bed grade Backfill: No earth or fine-gran soil backfill should be used for temporary culvert crossings. Backfill should be clean, coarse gravel.
			If no structures or reinforcement are in place, stagger tire tracks to minimize rutting.
			Construct stream crossings during low flow periods.

Pre	During	Post	BMP
			Monitor stream crossing structures during the timber harvest for plugging.
			Removal of crossing (if it has a chance for plugging) prior to winter or large incoming storms.
			Veg 2- Erosion Prevention & Control
			Prohibit all ground-based mechanical equipment entry into unstable areas (unstable riparian reserves), such as active landslides & inner gorges. Inner gorges are 65% & above slopes immediately adjacent to stream beds. They extend up slope until a slope break where slopes are less than 65% or at ridge top.
			Use of a feller-buncher (Tracked Vehicle) is preferred on slopes greater than 35%. Otherwise, if necessary to reduce fuels loading, end-line or tether from the butt end of felled hazard trees to roads to minimize ground disturbance. Preference is to leave felled hazard trees if fuels density meets objectives.
			Repair all water control features (especially on roads) & maintain in working condition post-haul or prior to big storms and/or prior to winter (end of season work)
			Prohibit new landing construction.
			Prohibit ground equipment on road cuts/road fills over 25% slope.
			Veg 3- Aquatic Management Zones (Riparian Reserves & Streamside Management Zones, RRs & SMZs)
			Retain all riparian-associated vegetation within the SMZs & RRs of seeps, springs, & unstable areas.
			SMZs have been identified & marked in the field with blue/white stripe flagging.



RR & SMZ width for each streamclass: (All distances are by Slope)

Stream	Riparian Reserve Buffer	Streamside Management Zone Buffer in	SMZ outside RR
Fish Per	600 feet (300 ft/side)	50 ft/side or to the slope break if further	N/A
Perennial	300 feet (150 ft/side)	50 ft/side or to the slope break if further	N/A
Intermitte	200 feet (100 ft/side)	50 ft/side or to the slope break if further	N/A
Springs	100 feet	50 ft/side or to the slope break if further	N/A
Wetlands	100 ft (<1ac) 150 ft (>1ac)	50 ft/side or to the slope break if further	N/A
Ephemera	N/A	50 feet	50 feet

			Consult with the district hydrologist or fish biologist regarding any stream crossings.
			Consult with the district hydrologist or fish biologist regarding any temporary road placement within RRs or SMZs.
			No landings permitted within RRs or SMZs.
			Tractor piling is not permitted within RRs or SMZs.
			For RRs: Retain at least 70% ground cover (litter, duff, rocks) evenly distributed across the treatment area.
			Retain at least 70% ground cover (litter, duff, rocks) evenly distributed across the SMZ treatment area.

Pre	During	Post	BMP
			Retain extra wildlife stems standing in RRs and SMZs to meet ACS.
			Retain stems that are creating stream bank stability.
			Fall trees cut in the SMZ must be felled toward the RR (perpendicularly to the drainage). If it is necessary to remove the tree, it should be end lined or grapple skidded from outside of the SMZ, suspending one end where feasible.
			No ground-based mechanized equipment will be allowed in SMZs.
			Veg 4- Ground-Based Skidding & Yarding Operations
			Fall only trees deemed a hazard according to the Hazard Tree Guidelines for USFS Region 5 in Roadside areas.
			Locate skid trails outside of the SMZ to the extent practicable.
			Locate skid trails to avoid concentration runoff and provide breaks in grade. Avoid long run on steep slopes.
			Limit the grade of constructed skid trails on geologically unstable, saturated, highly erodible, or easily compacted soils.
			Reduce ground disturbing impacts as much as possible in RRs (i.e., soil compaction, vegetation disturbances, etc.). Removal of material in RRs by ground-based heavy equipment will be limited to stable slopes less than 35% with utilization of line pulling within a 100 feet of streams with rubber tire based heavy equipment, with designated skid trails with full ground cover by litter & or woody debris with the use any ground-based heavy equipment.
			Prohibit equipment in meadows, such as Yellow Jacket Meadow, which is to be treated as an equipment exclusion zones. Material may be removed from this zone however heavy equipment is excluded & would require review & approval by District or Forest Hydrologist for entry.
			Prohibit equipment in meadows, such as Yellow Jacket Meadow, which is to be treated as an equipment exclusion zones. Material may be removed from this zone however heavy equipment is excluded & would require review & approval by District or Forest Hydrologist for entry.
			Swales or zero-order draws outside SMZs, should not be used as skid trails. (This is needed is at least units with High Burn Severity).
			Any material resulting from project activities causing obstruction of stormflows, (immediately upstream of culverts), would be removed.
			Ensure mechanical operations occur during dry soil conditions; typically, May 15-October 15, minimizing impact & reducing the potential for increased erosion.
			Limit ground-based heavy equipment to stable slopes less than 35%. Occasional use on stable slopes up to 40% for a distance not to exceed 100 feet is acceptable.
			Retain at least 70% ground cover (litter/duff/rock) across all treatment areas. Retention & even distribution of fine vegetation (rather than rocks) should be favored for ground cover & nutrient cycling.
			In units with High Soil Burn Severity with limited or no ground cover remaining, falling of dead non-merchantable stems will be required to help create protective ground cover before heavy equipment entry occurs. (If designated skid trails are used, this may only be needed along those designations).

Pre	During	Post	BMP
			Fall merchantable trees perpendicular to roads to minimize the skidding lengths.
			Align non merchantable hazards trees along the contour to create erosion control, if possible, given safety considerations.
			Preference for utilizing tracked feller bunchers.
			Maintain ALL live or possible resprouting vegetation for stability.
			Prevent water concentration by back blading or water-barring any soil displacement that is caused by the mechanical equipment (greater than 4 inches in depth).
			Ensure recognition & protection of areas related to water quality protection delineation on Sale Area Maps (SAMs). The sale administrator & purchaser will review these areas on the ground prior to commencement of ground disturbing activities. Examples of water quality protection features that will be designated on the project map include: 1) Location of stream courses & riparian reserves to be protected 2) Wetlands (meadows, lakes, springs, etc.) to be protected. 3) Unstable areas to be protected
			Remove all logging machinery refuse (tires, chains, chokers, cables, & miscellaneous discarded parts).
			Install any suitable drainage features to prevent erosion.
			Provide ground cover where needed.
			Veg 6- Landings
			Remove all logging machinery refuse (tires, chains, chokers, cables, & miscellaneous discarded parts).
			Install any suitable drainage features to prevent erosion.
			Provide ground cover where needed.
			No landings permitted within RRs or SMZs.
			Water Use 3- Administrative Water Developments
			Ensure, the water drafting rate for fish-bearing streams will not exceed 350 gallons per minute for streamflow greater than or equal to 4.0 cubic feet per second (cfs).
			Ensure stream flow below 4.0 cfs have drafting rates that do not exceed 20 percent of that flow.
			Ensure that at no time is downstream water flow is reduced to a level that would be detrimental to aquatic resources, fish passage, or other established uses, by water source development needed for road construction & maintenance, dust control, & fire control. Review and approval of water developments is required by District or Forest Hydrologist and Fisheries Biologist.
			Draft from existing locations/ramps.
			Utilize a high-volume pump to get water into water trucks instead of having trucks back into waterway.
			Prevent contamination of fuels & chemicals into waterways by follow Road 10/Chem 5.
			Ensure all water-drafting vehicles contain petroleum spill kits. Dispose of absorbent pads accordingly.

8.7. Recreation

- The public would be notified through the media and communication with user groups of any temporary closures of trails or roads resulting from road reconstruction, harvest operations, and other proposed activities.
- Signs notifying forest visitors of possible delays due to harvest activities along open roads would be placed at junctions providing alternate routes to avoid traffic disruptions.

Visual Design Features:

- Whenever possible, buffers, or retention areas would be created along recreation corridors to provide some shading, screening, and physical distance to lessen the short- to mid-term impacts of proposed activities on recreation use and quality.
- Stumps would be cut as low to the ground as practicable for a distance of 25 feet from the trails, roads and campgrounds
- Non-merchantable trees felled alongside the trails and campgrounds for safety and not removed, would be cut directionally away from the trail and an effort made to arrange them to create an appearance of naturally-occurring downfall.
- Residual slash concentrations, root wads, and other debris would be kept to a minimum for a distance of 25 feet from roads and out of the retention VQO areas
- Where feasible, retain screening trees one tree-height below new temporary roads and landings when viewed from below.
- Avoid creating a straight edge of trees by saving clumps of trees and single trees with varied spacing. Screening would reduce visual effects of temporary roads
- Landings in units alongside FH 7 should be placed on secondary haul routes rather than next to the primary recreation corridor.
- Where new temporary roads and skid trails meet a primary travel route, they should (where feasible) intersect at a right angle and curve after the junction to minimize the length of route seen from the primary travel route.
- Where hazard trees are felled and not removed, fall them directionally away from the trail, keeping the trail corridor clear. Where possible, retain pockets of vegetation along the trail (for a distance of 25-50 feet on either side of the trail) to provide visual screening and to buffer dust and noise.
- Chip, burn, or otherwise dispose of landing piles within view of trails, campgrounds, and roads.

Recreation Design Features:

- Contract Provision or Forest Service (FS) To protect public safety, the Black Butte trailhead and would be temporarily closed during road reconstruction, harvest operations, and log hauling on, across, or alongside the trails.

- Designated trails within the project area would be identified as protected improvements and be returned to a condition meeting trail management objectives to the extent possible. Once harvest and subsequent activities are completed, Trail would be rebuilt to foot trail specifications and Trails would be rebuilt to pre-haul conditions.
- Trail and Campground infrastructure such as barriers, signs and markers, and drainage features would be replaced, repaired, or constructed as necessary.
- Where present, retain pockets of understory vegetation and scattered groups of sound trees alongside the trail to lessen impacts to the semi-primitive trail character. Where possible, leave groups of snags outside the reach of the trail corridor.
- When project activities are complete, re-establish the trail corridor and return the trail tread to a 24-inch width.
- Access to skid trails will be blocked off to prevent unintended motorize use.
- Hazard trees felled and not removed in dispersed camping areas designated on the MVUM would be bucked and limbed as necessary so they do not block access to established dispersed sites known as DC spur road on the MVUM. DC85615, DC85605, DC85614.

8.8. Silviculture

- Implement varying Probability of mortality (Pm) across all treatment units according to silvicultural prescriptions and tree marking guides (Silviculture Report)
- Limit hazard tree abatement along forest roads to 1.5x tree height above the road (uphill), and 1x tree height below the road (downhill). On relatively flat ground use 1.5x tree height.
- Protect retained trees and snags.
- Hardwood snags do not count towards required snag minimum.
- Protect natural regeneration, including sprouting oak species and madrone.
- Protect recovering riparian vegetation (especially elderberry).
- Apply borate compound to cut live trees in unit 310 (surrounding the campground).

8.9. Soils

- Skid roads opened for the project will be ripped, slashed, and have water bars installed. These actions would minimize the chances for excess erosion and reduce soil compaction created during project implementation. Water bars would be installed in accordance with Forest Service Handbook 2409.15 R5 supplement 2409.215_2012-01 Chapter 60. Waterbar spacing is expected to use the Erosion Rating of High for skid roads. (Plaskett-Keller Hydrology Report)
- Within salvage units that have moderate and high Soil Burn Severity, no understory burning or dozer piling for 5-10 years post August Complex, unless soil conditions are re-evaluated by a soil scientist.

- Mechanical operations will be planned for maximum soil dryness in high compaction hazard units.
- Portions of Units 1006 (roadside hazard) and 271 will have equipment operations restricted to less than 30% slopes. (Figure 1 Soils Report)
- Machine piling operations would remove only enough material to accomplish project objectives and would minimize the amount of soil moved into burn piles. Equipment would be chosen to minimize detrimental impacts to soil, primarily by utilizing features such as booms with grapples and low ground pressure tracks. Duff and litter layers would remain as intact as possible, and the turning of equipment would be minimized. Piles will be constructed as tall as possible, within limits of safety and feasibility. A mixture of fuel sizes in each pile is preferred, avoiding piles of predominately large wood when practicable.

8.10. Wildlife

Piles planned for burning should be lit only on one side (uphill side) to allow wildlife to escape.

Marten, Fisher and Wolverine: An LOP would be applied within ¼ mile of any known or found marten, fisher or wolverine den sites from February 1 to June 30 for protection against noise disturbance.

American Peregrine Falcon: An LOP for peregrine falcons would be applied during the breeding /nesting season (February 1 through July 31) for protection against noise and smoke disturbance within ½ mile of a known nest if they are identified during pre-treatment surveys.

Pallid Bat, Townsend's Big eared bats or Fringed myotis: An LOP would be applied within 300 feet of any rock outcrop or other known roost structure or site for pallid bats, Townsend's big eared bats or Fringed Myotis from May 15 to August 15 for protection against noise and smoke disturbance.

Northern Spotted Owl (NSO):

- All treatments will maintain a minimum of four snags and four down logs per acre as per the Mendocino National Forest Land and Resource Management Plan.
- There will be no treatments in any 100-acre Late Succession Reserves (LSR) or NSO nest groves regardless of any current NSO habitat suitability.
- Operator would not cut any snags or trees with nests regardless of tree diameter and health, unless they pose an immediate safety hazard.
- No new landings are to occur in any NSO suitable habitat. If new landings are needed, consultation with the district biologist would occur first. Limited Operating Periods: Northern Spotted Owl: A limited operating period (LOP) for Northern spotted owls would be applied during breeding/nesting season (February 1 through July 31) for protection against disturbance

or work within ¼ mile of an Activity Center or un-surveyed nesting/ roosting habitat. Treatment areas with an LOP would require a 6-visit protocol survey or a 3-visit spot check just prior to implementation to release them from this restriction pending on whether the 2-year survey has been complete. If owls are located, additional visits would be required until nesting or non-nesting was confirmed. If nesting activity was confirmed, an LOP would remain.

- A limited operating period (LOP) will be imposed in all or part of unit 5, 20, 21, 251, 272, 32, 33, 311, 310 and 340 which are all within ¼ mile of northern spotted (NSO) Nest/ Roost habitat and active activity centers. Portions of roadside salvage and fuels treatments along routes on the FH7, 22N11, 22N37, 22N23, 22N10, 22N54, 22N17, 22N17A will also have LOPs which are within ¼ miles of Nesting Roosting habitat and active activity centers. No operations would occur in all of these units and along portions of these roads between February 1 and July 31 unless the owls are shown to be non-nesting.

- A limiting operating period (LOP) will be imposed for all landings and temporary roads that fall within ¼ mile of northern spotted (NSO) Nest/ Roost habitat or ¼ mile within an activity center.

- A limiting operating period (LOP) will be imposed for all Post Fire Foraging (PFF) habitat that fall within treatment units.

- For phase 2 after this project, Post Fire Foraging (PFF) habitat proposed to be treated would be a focus for replanting.

- Post-implementation monitoring of all project units would occur in assessing NSO habitat.

Snag Retention

Snags are important for a variety of species on the Mendocino National Forest including pileated woodpecker, hairy woodpecker, and other cavity nesting birds. Although there are plenty of snags post-fire available on the landscape it is important to locate and maintain the most viable snags for these species that will last for several years as it may be hundreds of years before there are snags available to replace these snags when they fall.

The Mendocino National Forest LRMP has a habitat capability model for snags and can be found in Appendix E (USDA 1995). For this project we will be maintaining optimum snag habitat. The forest plan recommendations are described in

Table 33. The Mendocino will be looking to clump snags when possible as it is more suitable to the preference of woodpeckers to have snags closer together. Hard to soft ratio for snags is not likely to be met as any soft snags were removed during the fire. If there are soft snags remaining and they do not pose a hazard they should be maintained. A variety of species of snags will be targeted.

Table 33. Snag retention guidelines from the Mendocino Land and Resource Management Plan for Montane conifer.

Habitat Variable	Optimum	Sub-optimum	Low
Average density			
…15-24" DBH	>3.0/acre	1.2-3.0/acre	<1.2/acre
…>24" DBH	>0.5/acre	0.2-0.5/acre	<0.2/acre
…Total	>3.5/acre (max 10/acre)	1.4-3.5/acre (max 5/acre)	<1.4/acre (max 3/acre)
Height	>40 feet	20-40 feet	<20 feet
Dispersion	One group per 5 acres or less, with 15+ snags	One group per 5-15 acres, with 5-15 snags	Even dispersion
Hard:Soft Ratio	>3:1	2:1-3:1	<2:1
Location	Edges of meadows, brushfields, streams, and other water	Throughout wooded stands	Rocky, open slope, Barren areas
Species	Douglas fir, Gray pine, Ponderosa pine, black oak, blue oak, madrone	White oak, live oak	

Course Woody Debris (CWD) Retention

Although the NSRP will remove some of the dead and down CWD from the project area there is a requirement to maintain 5 to 20 tons/acre of course woody debris comprised of a minimum of four recently downed logs per acre. When present, focus retention on logs equal to or greater than 20 inches in diameter (large end), or the largest diameter logs available. Retained logs should range from 15 to 20 feet in length, with one log per acre greater than 20 feet in length.

Fuels treatments propose leaving between 5 – 20 tons/acre of down course woody material. This amount was indicated to be the optimum quantity of CWD for wildlife in warm dry ponderosa pine and Douglas-fir types (Brown et.al 2003). Retaining this amount of CWD will allow the forest to maintain legacy components needed for forests to develop into stands that are variable and complex.